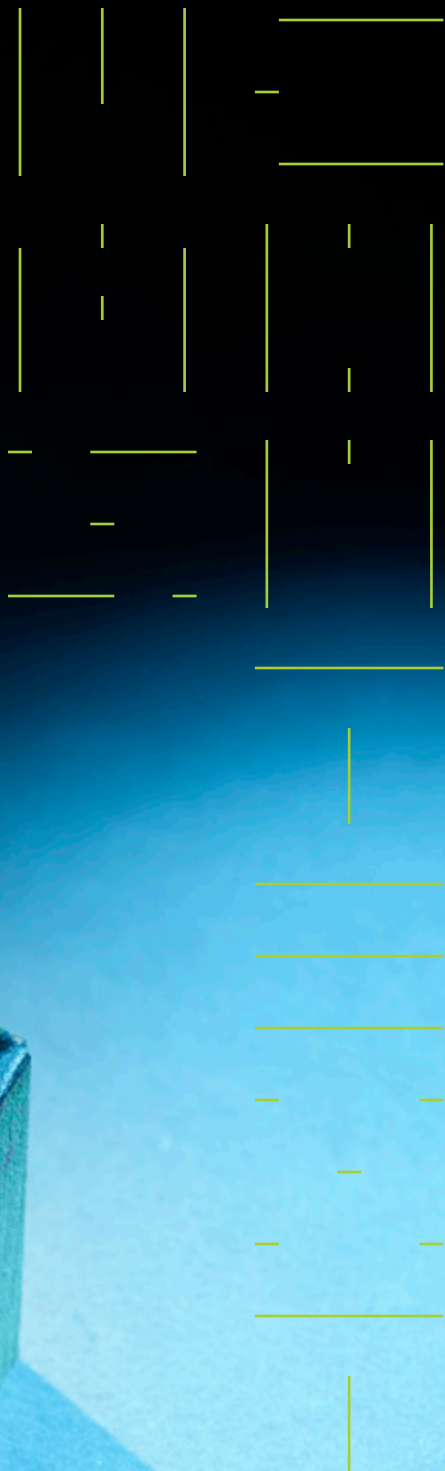
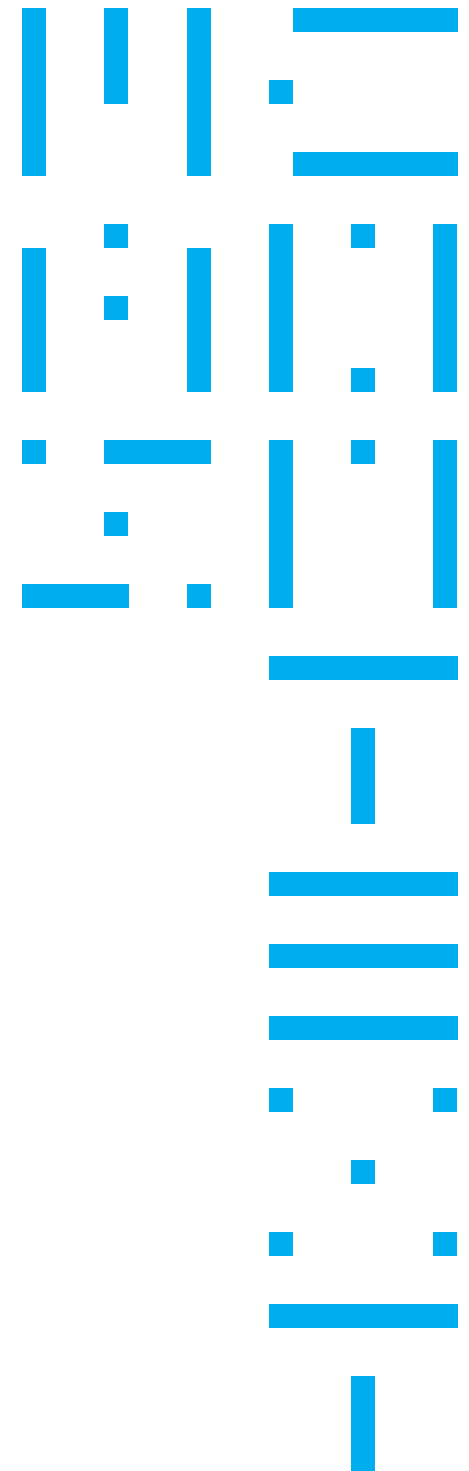


MAS Context
Issue 21 / Spring '14
Repetition



MAS Context
Issue 21 / Spring '14



Welcome to our Repetition issue.

Through eighteen contributions we immerse into a world of monotony, variation, experimentation, replicas, strategies, simulations, imperfections, and routines. We do so in long and short essays, photo essays, interviews, videos, manifestos, and projects. A combination of contributions that question, embrace, and ultimately work with the topic at hand.

On top of the varied format of our contributions you will find another aspect added to the mix. Each contribution is uniquely interpreted by a designer based in Chicago, all under the creative direction of Rick Valicenti and Bud Rodecker from Thirst. A specific identity for each contribution that makes up an issue on repetition. We had fun adding even more variation to the topic.

In the end, repetition does not have to be boring.

MAS Context is a quarterly journal that addresses issues that affect the urban context. Each issue delivers a comprehensive view of a single topic through the active participation of people from different fields and different perspectives who, together, instigate the debate.

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True Repetition

Six years ago I spent a few days with my family in Corralejo, a town located on the northern tip of Fuerteventura, one of the seven islands of the Canary Islands. Winters run “a little long” in Chicago, so spring seemed the perfect time to take a break from the cold. One day we decided to visit a new resort development that had just been built outside the town. Upon arriving we found a new residential area of about a hundred and fifty villas. All identical. Same colors, same architectural features, same layouts. Their white façades and blue cupolas seem to fit better in Greece than in Corralejo. Without any inhabitants or signs of daily use (construction had just finished), there was nothing that differentiated them. Only the surrounding landscape interfered with the otherwise monotonous repetition of the development. Located near one of the edges of the development there was a small mountain that provided a significant visual cue of orientation and context.

This is just one of the infinite examples of repetitive housing developments existing around the world. They have been discussed in uncountable essays and perfectly documented in photo essays like “Dwellings” from Alex Maclean, “Suburbia Gone Wild” by Martin Adolfsson (featured in our Ownership issue), or the “Two Million Homes for Mexico” by Livia Corona Benjamin included in this issue. Like the identical restaurants of a fast food chain, these developments multiply and colonize the territory, spreading like a disease.

But if we look past the first impression and the repeated architectural features, we see that in reality each one of the houses and each one of the developments is somehow unique. It is our presence that makes them unique. We bring our lifestyle, experiences, upbringing, values, and understanding of life. We all come from different backgrounds, have had different experiences growing up, have most likely lived in different places, and have related to different people. Each one of those aspects shapes who we are and makes us distinct. And therefore we create one-of-a-kind environments, impossible to repeat.

To take this a step further, our relationship with that environment is also unique depending on different factors. Having visited the same place multiple times, different weather conditions, acoustics, light levels, number of people, or personal circumstances make each visit a different experience. Like a band that you have seen several times live, you will experience and remember each concert differently, even if they are all from the same tour and they are playing the same set. Yep, I have been in that situation on more than one occasion. In the end, there is no true repetition.

I haven’t had the chance to go back to the housing development in Fuerteventura but I am sure that, if I ever go back, my second experience would be different: the houses have been occupied now for a few years, which in reality translate to a few weeks or seasons of use by the occasional visitor; the limited amount of plants that existed have grown; and I am sure other signs of life, use, and wear are present. I am not sure if this second experience would be better or worse than my first, but it would definitely be unique. What I am sure though is that it won’t make me like that development in the least bit.



Issue statement by Iker Gil,
editor in chief of MAS Context.

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POSCONFLICTO
LABORATORY:
MORE AND MORE
ABOUT
LESS AND LESS
AND
LESS AND LESS
ABOUT
MORE AND MORE

Acta

In the name of those who wash others' clothes
(and flush from their whiteness another's filth).
In the name of those who care for others' children
(and sell their labor
in the form of maternal love and humiliations).
In the name of those who live in another's home
(no longer a warm hearth but rather a tomb or jail).
In the name of those who eat another's scraps
(and still chew them feeling like thieves).
In the name of those who live in another's country
(the houses and the factories and the businesses
and the streets and the cities and the towns
and the rivers and the lakes and the volcanoes and the mountains
always belong to others
and thus the police and the guards are there
protecting them from us).
In the name of those who have nothing more than
hunger, exploitation, sickness,
thirst for justice and water,
persecutions, imprisonment,
solitude, abandonment, oppression, death.
I accuse private property
of depriving us of everything.¹

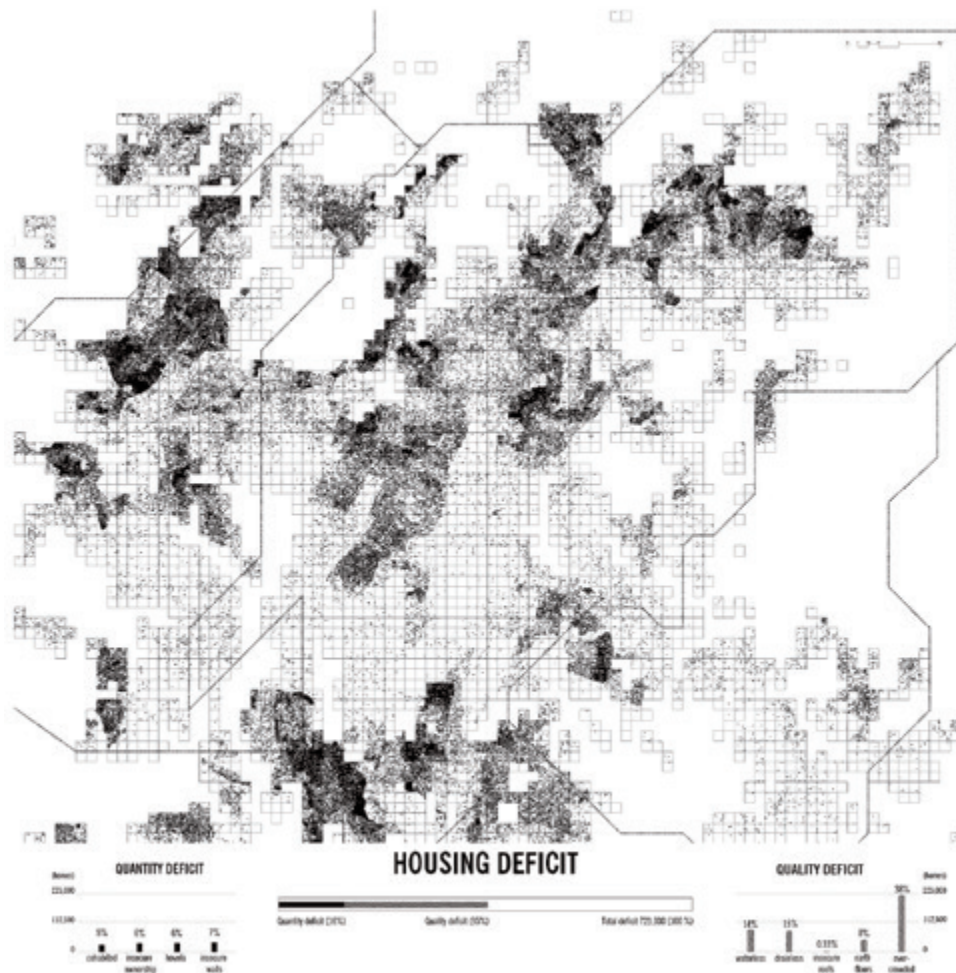
Roque Dalton

ESSAY BY
Roberto Soundy

PROJECT BY
URBANÍSTICA—Empresa Metropolitana
de Vivienda y Desarrollo Urbano
de la Ciudad de Guatemala and Asociación
Centroamericana Taller de Arquitectura
(a—c—t—a)

Preconflicto, a photomontage
of "Glorious Victory"
(Diego Rivera, 1954; photograph:
Secretariat of the Presidency,
Republic of Guatemala) and
housing units at Lafayette Park,
Detroit (Ludwig Hilberseimer
and Mies van der Rohe, 1956).
© a—c—t—a

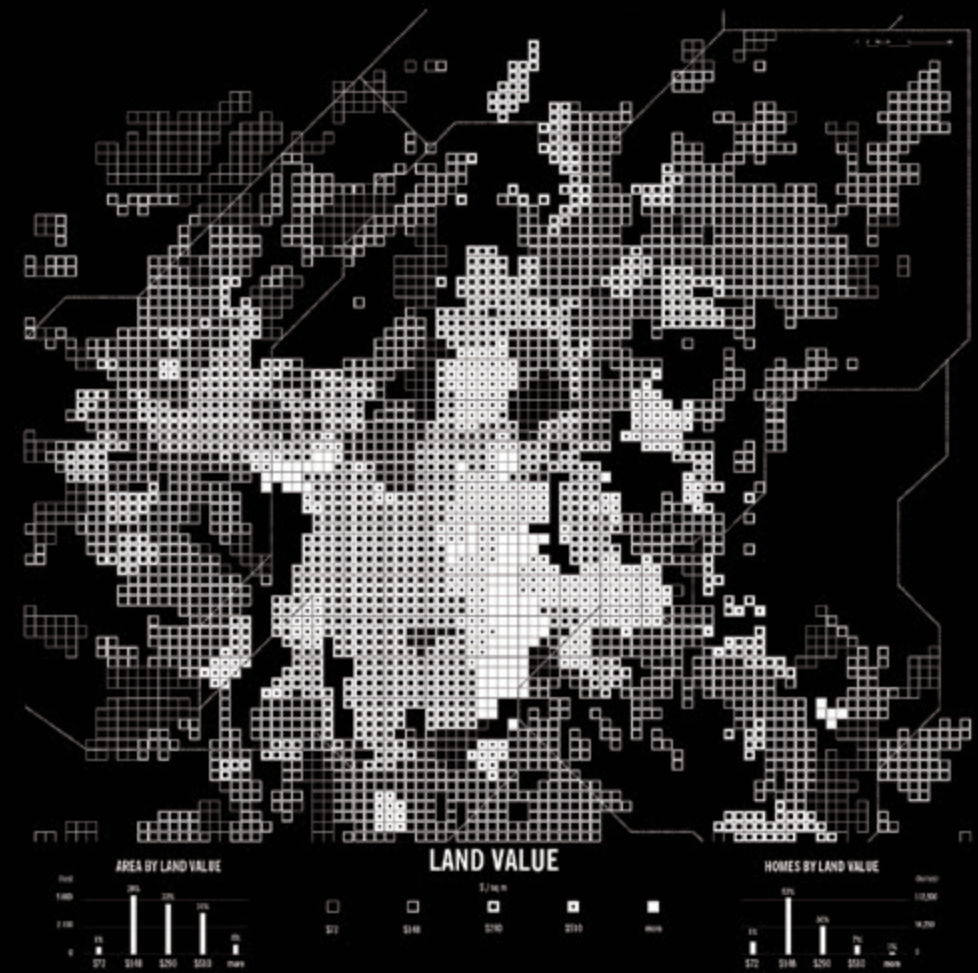




I. With the signing of the Peace Accords between the Government of Guatemala and URNG (*Unidad Revolucionaria Nacional Guatemalteca*) in 1996, Central America's last armed conflict came to an end.² In a post-conflict political context, in spite of efforts in plans and policies, Central America has yet to revert to a structural housing deficit. Recalling Roque Dalton's "Acta," the *Posconflicto* Laboratory declares the urgent necessity of a project to rethink architecture, the city, the territory, and the idea of the political to guarantee housing access to all—especially the most disfavored and vulnerable. The laboratory acknowledges the persistence of a long-standing colonial urban land structure in Guatemala City, where land ownership and income inequality have progressively deepened. But it also

acknowledges the underlying colonial legacy of ethnic discrimination and class exploitation, and furthermore considers imperative—in countering social segregation within the city—to rethink the post-conflict political subject. Today, labor has been subsumed within the radically disputed city itself, where it reproduces in increasingly contradicting, diffused, and precarious modes. Housing as a human right reverberates as a Cold War pamphlet, where its social demand has been translated exclusively as a qualitative and quantitative abstraction. In this context, the *Posconflicto* Laboratory proposes a housing project directed towards the construction of a municipal and Central American housing policy. Fundamentally, the *Productive Housing Program* seeks to revert the chronic housing deficit of both low and middle

MAPPING HOUSING DEFICIT IN METROPOLITAN GUATEMALA CITY, 2012. © POSCONFLICTO LABORATORY



income sectors unprotected by public policy, and proposes to reinstall a principle of subsidiarity in central urban areas through the provision of a new political pact. The program's financial sustainability is ensured by a system of crossed subsidies, where a newly created public agency performs middle income market housing operations, channeling a percentage of its profits to subsidize self-managed cooperative housing operations directed towards a low income segment of the population.³ In thinking about the productive, the project seeks to reframe the idea of labor and its relationship with production and the generic, in the context of the post-conflict Central American city at large. The *Posconflicto* Laboratory calls for a project to confront a colonial legacy of social and economic inequity, and to counter neoliberal

urbanization's ever-expanding urban segregation and "pacifying" force. With a pilot project in Guatemala City, and operating from within the *generic*, architecture becomes the foreground and proactive, and acts as a steering agent for the urgent provision of adequate housing and the possibility of making city in Central America.

MAPPING LAND VALUE IN METROPOLITAN GUATEMALA CITY, 2012. © POSCONFLICTO LABORATORY



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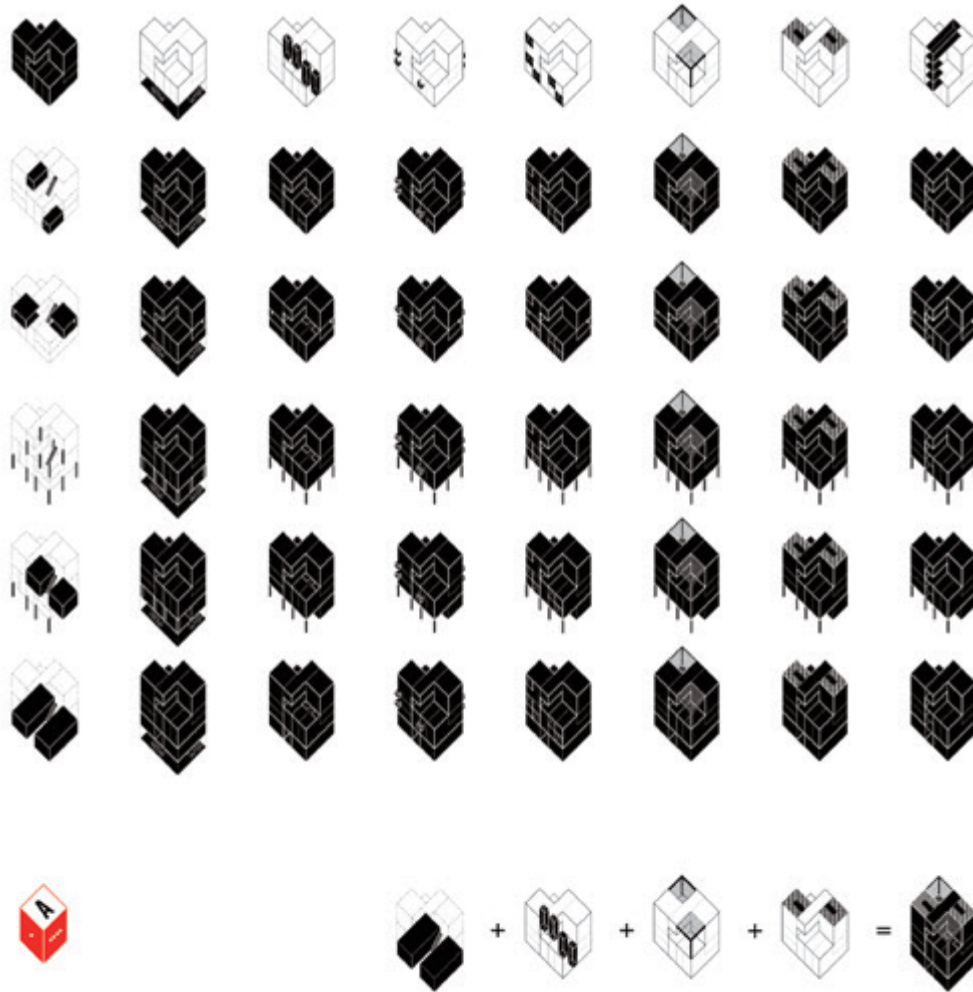
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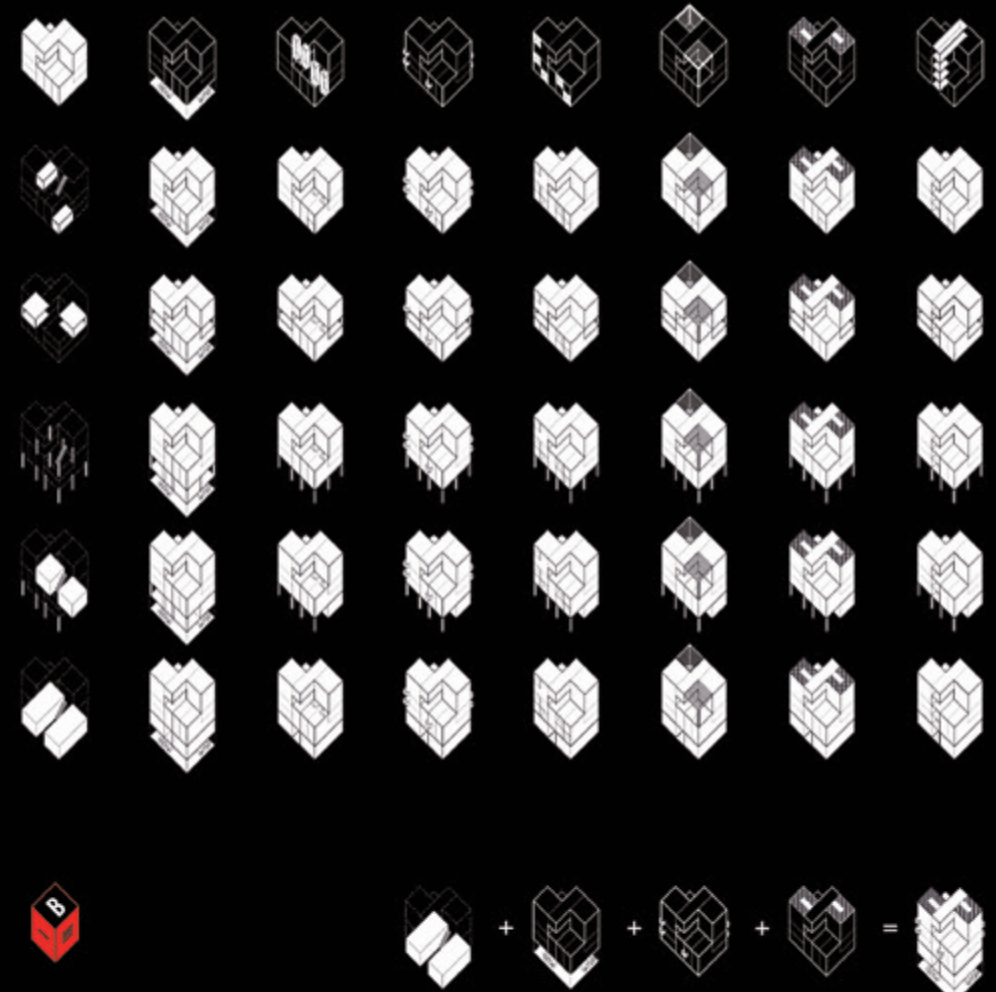


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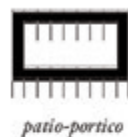
II. Not surprisingly, considering an overarching political apathy, the Guatemalan Social and Economic Accords continue to be a defeated historical demand for both rural and urban social movements.⁵ The recently passed Housing Law, promoted from within the nation-state scraps, represents a milestone in the struggle for adequate housing. But it remains powerless in providing any tangible means of production, and will continue to be an instrument of statistical abstraction and servile dependence.⁶ From a national outlook, the possibility of articulating a housing project, despite the “social function of land” as defined since the Guatemalan 1945 Constitution, remains radically utopian. As a reflection on colonial politics, *Preconflicto* represents a paradox within the 1954 coup d’état—a CIA covert operation

codenamed Operation PBSUCCESS—that brought an abrupt end to ten years of progressive democratic reform in Guatemala, and thereafter originated thirty-six years of internal armed conflict (1960–1996).⁷ From a standpoint of architecture, Diego Rivera’s mural, *Glorious Victory*, provides an unfolding political setting for architect Ludwig Hilberseimer’s Lafayette Park in Detroit (executed with the collaboration of Mies van der Rohe). Breaking ground in 1956, Lafayette Park embodies settlement principles of a postwar North American political and social ethos, where city planning provides no differentiation between urbanization and the city.⁸ For the Italian architectural historian Manfredo Tafuri, Hilberseimer’s project is conscious of the necessity to go beyond architecture as the design of objects, and to work within the



economic processes that produce architecture itself. Tafuri writes: “The only emerging imperative was that dictated by the laws of organization, and therein lies what has been correctly seen as Hilberseimer’s greatest contribution.”⁹ In this sense, the task of an architect is not in giving form to single elements of the urban fabric, but in identifying the “true unity” of the production cycle. Following a Social-Democratic agenda, Hilberseimer believed that the emerging modes of capitalist production could be tamed and reformed for a more rational organization of the city.¹⁰ In confronting and revealing the contradictions of capital, Lafayette Park’s “crossed subsidy” economic model—grounded on market and cooperative housing—today discloses the possibility of a post-conflict critique

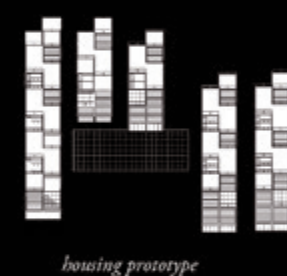
and the prospect of an autonomous housing project for Guatemala City.



Project A
The Co-operation

Pilot Project A
San Rafael Avenue, Zone 18, Guatemala City
56—Housing units—54m²
30—Cooperative productive spaces—16m²
11—Commercial spaces—14m²
1—Community development center—665m²
Plot size—3,755m²

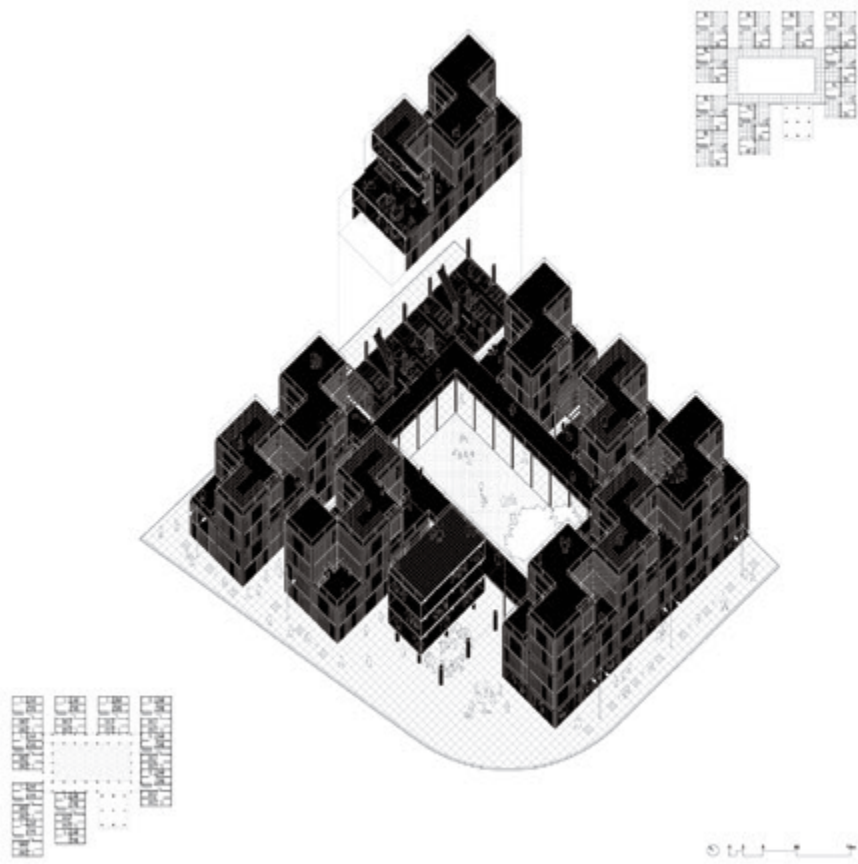
Project A, the subsidized operation, allows low-income families to access adequate housing and at the same time develop productive activities on-site, while integrating into central urban areas. Project A's target social group are families currently living in conditions of poverty and marginalization, with a monthly income between one and four times the minimum wage per household (\$290 to \$1,160) and no access to market housing. The project is organized into a self-managed cooperative based on mutual aid and collective property.



Project B
The Market Operation

Pilot Project B
9th Avenue, Zone 1, Guatemala City
56—Housing units—21 of 45m²; 29 of 54m²;
6 of 108m²
27—Extended productive spaces—16m²
21—Commercial spaces—54m²
1—Social facility—950m²
Plot size—3,719m²

Project B, the subsidiary operation, allows middle income families to access quality housing in central urban areas benefited by public sector urban recovery projects. Project B's target social group is the segment of the population currently renting with very limited options in the housing market, with monthly income between five and fifteen times the minimum wage per household (\$1,161 to \$4,350). The profit generated by this market operation provides the necessary capital counterpart to subsidize Project A.



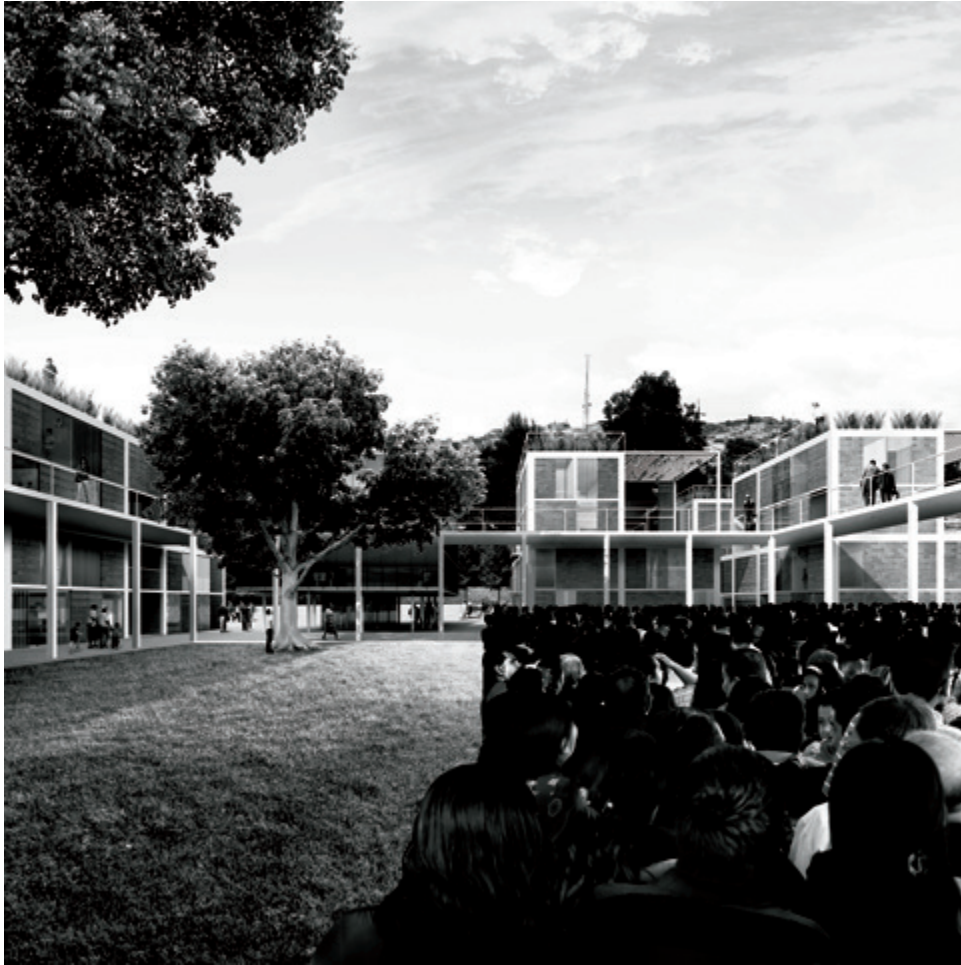
III. While the struggle for urban land and housing by the workers' social movements began organizing legally in Guatemala City soon after the October Revolution of 1944, the outst-
 anding unequal distribution of land and space segregation—a colonial legacy currently in force—demonstrated too great a feat for reformist politics. In 1953, an initiative for urban reform was proposed by the UCL (Union of Plot Buyers or *Unión de Compradores de Lotes*) with the support from PAR (*Partido Acción Revolucionaria*), PRG (*Partido de la Revolución Guatemalteca*), and PGT (*Partido Guatemalteco del Trabajo*) deputies in Congress, but was immediately defused due to political instability that followed the 1952 Agrarian Reform decree by the democratic government of Jacobo Arbenz.¹² To Guatemala's economic elite and their military

allies, as well as US corporations such as the United Fruit Company (Guatemala's biggest landowner at the time), Arbenz progressive social reforms were unacceptably "communist." As *Glorious Victory* denounces, Arbenz's popularly elected government was blatantly taken over in 1954 by a US-backed military coup. During the 1970s, in the midst of armed conflict, a fundamental intellectual debate takes place in Guatemala, confronting the historic conditions of social and economic inequity. A region with a predominantly native population, the debate on the strategy of political struggle for social justice has at its core the significance of the indigenous peoples as political subject. After publishing *Guatemala: una interpretación histórico-social* in 1970, Carlos Guzmán Böckler and Jean-Loup Herbert expand the discussion on Guatemala's



colonial situation, claiming how collective subjectivities and the system's self-fulfilling prejudices work to justify its existence.¹³ In their view, the established colonial regime originally bases itself on the idea of "white race" superiority—represented by *peninsulares* and *criollos*, and ultimately *ladinos*¹⁴—and a corresponding inferiority of the *indios*.¹⁵ Almost simultaneously in 1970, Guatemalan historian Severo Martínez Peláez published *La patria del criollo*, and opened up a heated debate on how the economic circumstances that assure prosperity for a few and deprivation for the majority hadn't been altered by independence from Spain in 1821, nor by liberal reform in 1871. Countering Guzmán Böckler and Herbert's *ladino-indio* ethnic class contradiction, Martínez Peláez proposes a Marxist interpretation based on society's division of social

class—namely, the exploiter and the exploited—where racism is attributed fundamentally to social discrimination generated by class struggle. "The self-improvement struggle of the 'indios' has to be fought not because the protagonists are the 'indios' but because they are exploited people."¹⁶ To Martínez Peláez, it is ultimately the *criollo* or creole class, in its condition of colonial latifundio or land-owning exploiter, that appropriates the work of the *indio* in the form of forced labor.¹⁷ In deconstructing class contradictions in Guatemala, the positions developed by Guzmán-Böckler and Herbert, and by Martínez Peláez have demystified the colonial legacy of social and economic inequity, and furthermore potentiated the strategic importance of struggle against space segregation and the possibility of urban reform.



IV. In Guatemala, thirty-six years of armed conflict (1960-1996) have left over 450 villages destroyed, over one million people displaced and over 200,000 people dead. In 1982, the Guatemalan army—under the direction of military dictator Efraín Ríos Montt—initiated a “scorched earth” counterinsurgency campaign indiscriminately massacring thousands of Maya-Ixil indigenous peasants. Genocide did take place in Guatemala.¹⁸ The brutality displayed by the elite-backed military government, and the inherent racism present in Guatemalan society have long called for wider interpretations on ethnic and class contradictions. The 1970s debate between Guzmán Böckler and Herbert, and Martínez Peláez advanced critical positions in addressing the colonial Latin American structural conditions, and had deep

implications within the ideological constructions of the Guatemalan insurgency. Among the revolutionary organizations, another debate took place between ORPA (*Organización del Pueblo en Armas*) and EGP (*Ejército Guerrillero de los Pobres*). The discussion centered on the strategic organization concerning the awareness and integration of indigenous peoples to revolutionary struggle. The theoretical positions that contributed most to this debate were articulated by Mario Payeras with *La cuestión étnico-nacional*—on EGP’s stagist positioning—and by Rodrigo Asturias with *La verdadera magnitud del racismo*—on ORPA’s cause and effect interpretation of racism against the indigenous population.¹⁹ Following Martínez Peláez, Payeras’ most significant contribution lies in unifying class and national-

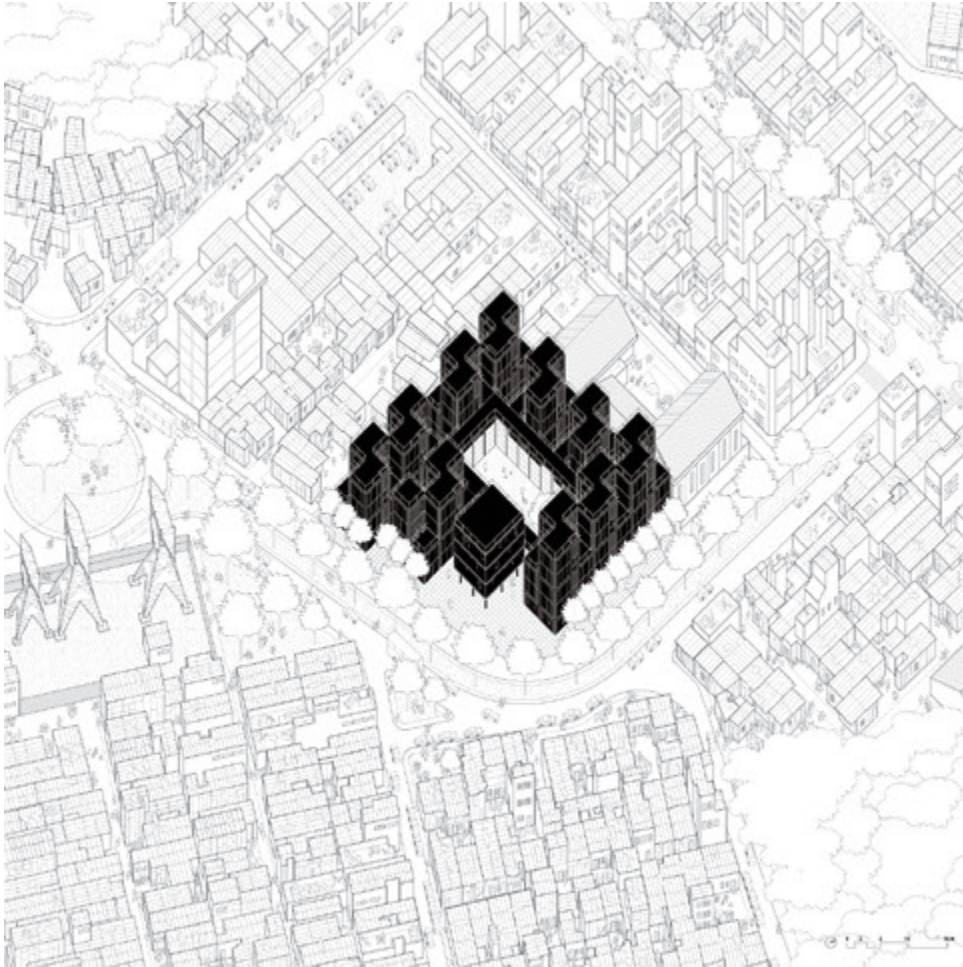
INAUGURATION DAY AT PROJECT A. © POSCONFLICTO LABORATORY



ethnic contradictions, with a concrete proposal of a multinational state grounded on ethnic and cultural rights, including political autonomy at a local level. In these lines, Payeras argues for economic policies vindicating indigenous peoples “to enable their true equality at the level of society as a whole.”²⁰ To Asturias, ex-commander of ORPA, racism “is the most comprehensive demonstration of exploitation and the major mechanism of oppression.”²¹ In his view, racism is also a fundamental apparatus of aggression, where its “true magnitude” actively operates within and throughout the production process, the labor force and ultimately surplus value. As a real source of segregation, racism is also a mechanism of confrontation present within and in-between the oppressed classes. The fact that two of the four revolutionary organizations

provided for theoretical contributions to racism and its relationship with the nation-state brought a considerable shift in its conception, and in the role of indigenous people throughout the revolutionary process.

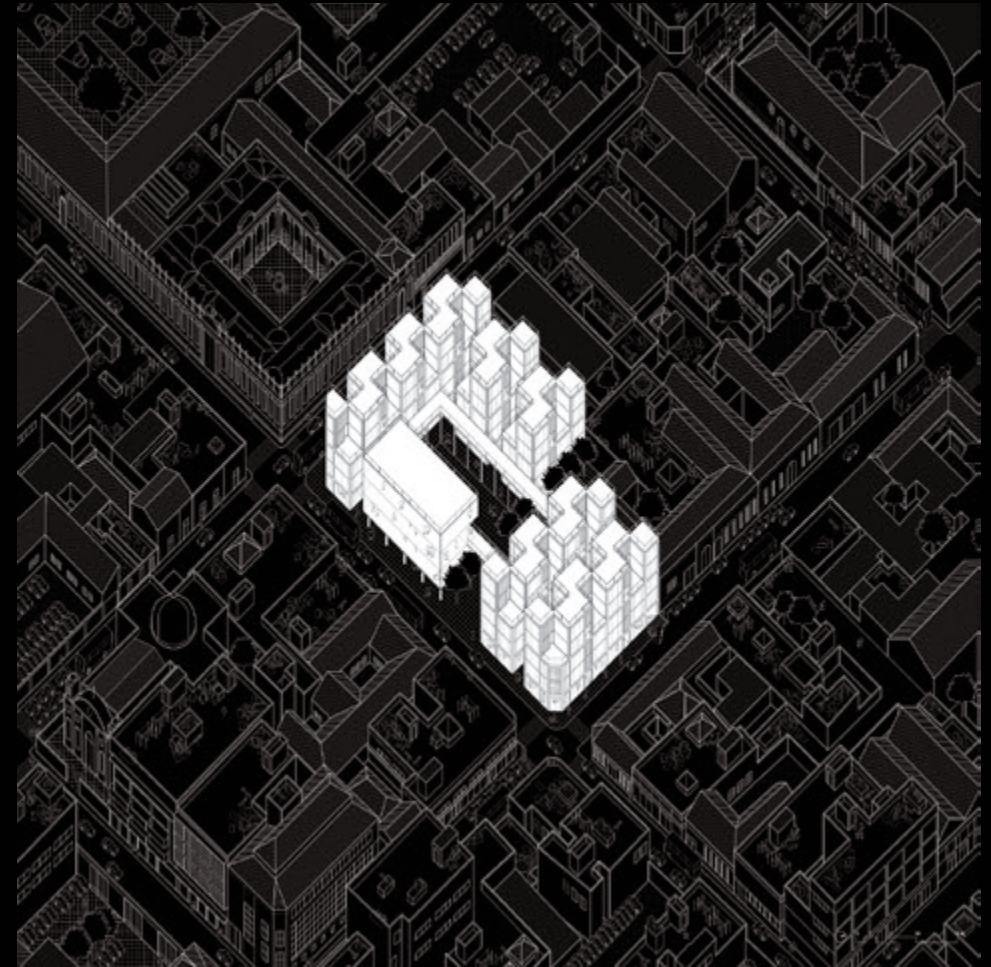
PICTURE FOR WOMEN AT PROJECT B. © POSCONFLICTO LABORATORY



V. Labor lies at the very core of human production where life, culture, affects, and politics are absorbed into one continuous space of relationships.²² Towards the latter part of the 20th century, Central America underwent an economic paradigm shift of production and extraction of capital: from a colonial agro-export model to a colonial and neoliberal economy based on service, commerce, and transnational finance. The colonial urban land structure has nevertheless persisted, where outstanding wealth and land ownership inequity has actually deepened. Fueled by neoliberal urbanization, colonial production has effectively merged the *latifundio* or large estate farming system and the *maquila* factory, with the predominant neoliberal remittance and service-based transnational capital.²³ No longer is labor

“the activity which corresponds to the biological process of the human body” separated from work and political life, as defined by Hannah Arendt, a political theorist, in the 1950s.²⁴ But rather, in its social and political organization, labor has become ubiquitous, diffuse, and totalizing. In *Capital*, Karl Marx defines labor-power as the “aggregate of those mental and physical capabilities existing in a human being, which he exercises whenever he produces a use-value of any description.”²⁵ Contrary to Arendt, Marx’s definition of labor recognizes not only physical and mechanical attributes, but also a “mental capability” and a “living personality” as a potential. In the earlier *Grundrisse*, Marx interprets general intellect as the scientific knowledge embodied in machines, effectively anticipating its development as

PILOT PROJECT A AT LA CEIBA IV, ZONE 18, GUATEMALA CITY. © POSCONFLICTO LABORATORY



society’s main productive force.”²⁶ Following Marx’s manuscripts, Italian philosopher Paolo Virno argues that intellectual activity has become the true basis of wealth production. Virno notes that “capitalists are interested in the life of the worker, in the body of the worker, only for an indirect reason: this life, this body, are what contains the faculty, the potential, the *dynamis*.”²⁷ According to Virno, rather than politics conforming to labor, it is labor that has acquired the traditional features of political action. While labor today has effectively changed, Central America is no exception: we need to acknowledge that production has shifted—in contradicting and superimposed manifestations—from the colonial space of the (pre-Fordist) *latifundio* and the (Fordist) *maquila*, to the diffused colonial and neoliberal space of the (post-Fordist) city itself.

We are forced to being political not for the sake of being political, but for the sake of generic production as a condition of labor power.

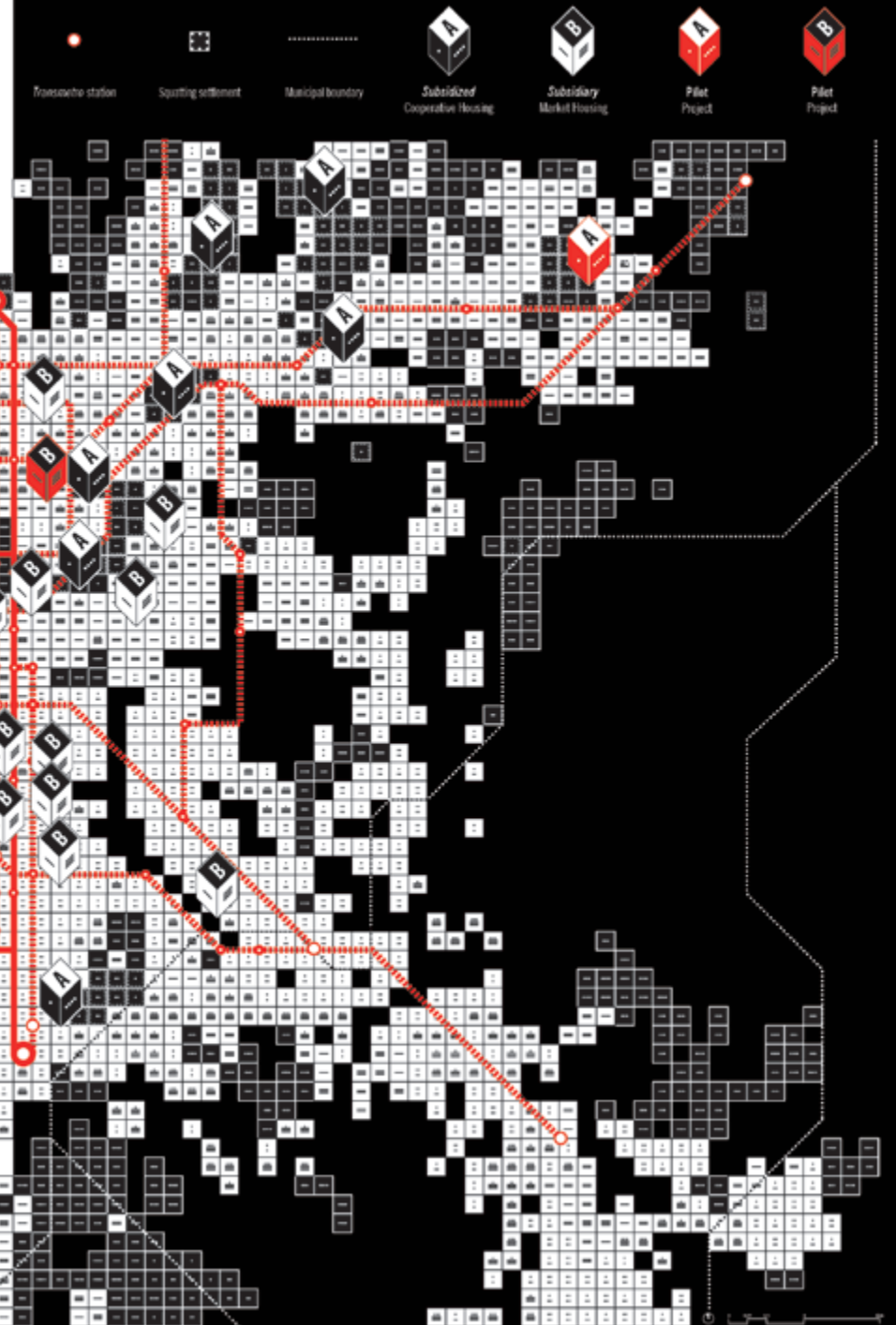
PILOT PROJECT B AT 9TH AVENUE, ZONE 1, GUATEMALA CITY. © POSCONFLICTO LABORATORY

LABOR POWER in Minimum Wages per Household*

*Monthly minimum wage per household in Guatemala = \$290 USD



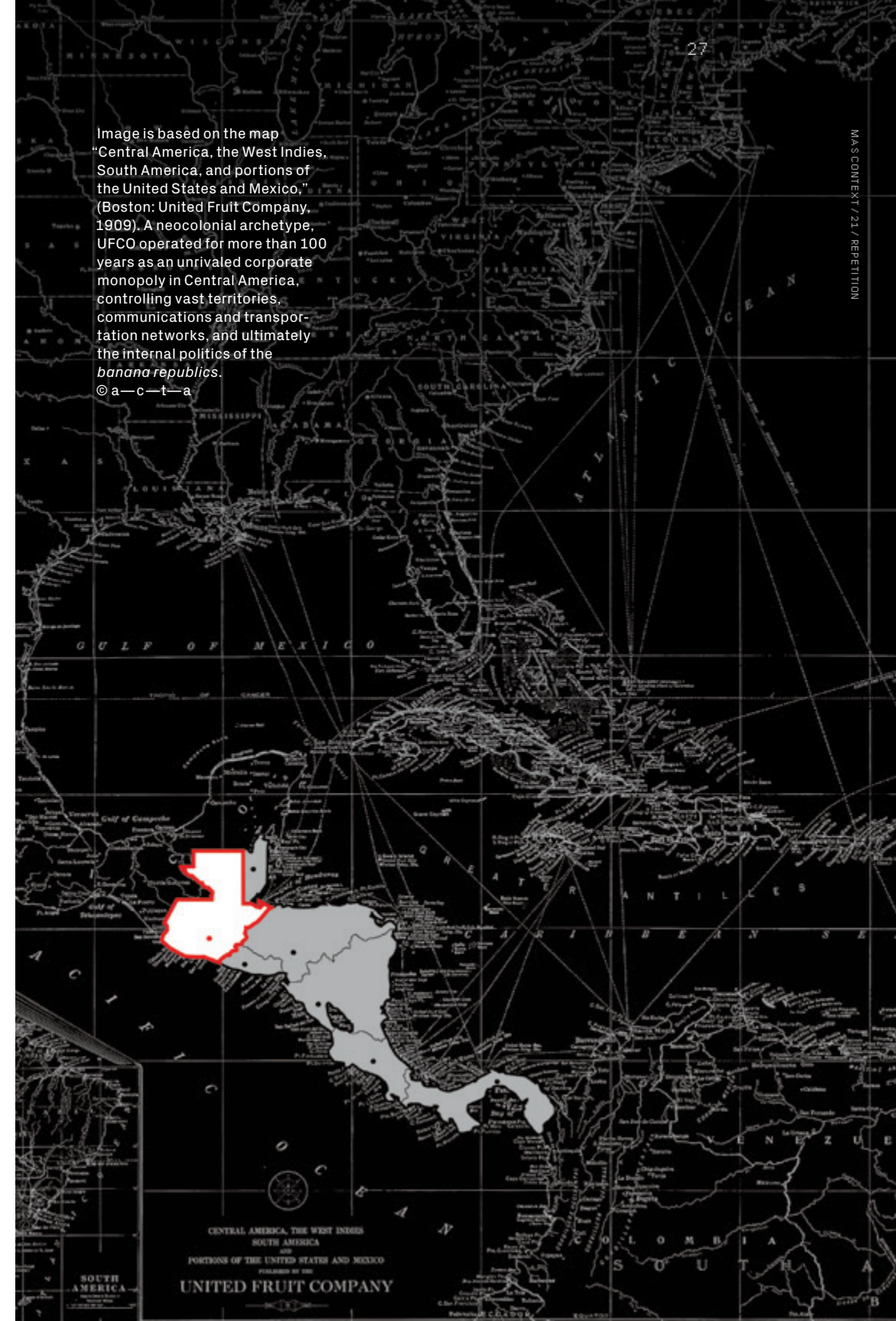
STRATEGIC PROJECTS Crossed Subsidy Model



VI. Production, the generic and irreducible form of labor, is at the core of the diffused colonial and neoliberal space of the post-conflict Central American city. Labor power has become its most concrete manifestation, existing only in potential: that is, in production as a possibility. To extract value from production requires capturing this possibility, as an essential activity of a human re-production organized within the city. Today, re-appropriation of the generic is becoming the fundamental spatial, formal, and even existential attribute of production.²⁸ In the *Productive Housing Program*, rethinking the productive and redefining the post-conflict political subject becomes paramount: Subject A is an individual person currently living in a marginalized condition of poverty or extreme poverty, with no access to adequate housing, and with a monthly income between one and four times the minimum wage per household (\$290 to \$1,160). Subject B is an individual person currently living in a marginalized suburban condition, with very limited options to acquire housing in central urban areas, and with a monthly income between five and fifteen times the minimum wage per household (\$1,161 to \$4,350). Both Subject A and Subject B represent labor power as a potential, and as the ultimate manifestation of self-awareness in production. A pre-condition of production, *the generic* is ever-present and is explored within the political subject's labor power, as an instance of repetition. The *Productive Housing Program* implements a transfer model mechanism of financial resources to revert the chronic housing shortage of popular and lower-middle income sectors unprotected by public policy. Subject A is more and more about less and less. And Subject B is less and less about more and more. Both subjects, however, are always about less and less.²⁹ The profit generated by Project B's market operation provides the necessary capital counterpart to subsidize Project A. Project A, the subsidized operation, allows Subject A to access adequate housing and at the same time develop productive activities on-site, while integrating into central urban areas. Project B, the subsidiary operation, allows Subject B to access quality housing in central urban areas benefited by public sector urban recovery projects. The model's productive sustainability is maintained by a system of crossed subsidies, where a newly created public agency performs both market and self-managed cooperative housing operations.

VII. The *Productive Housing Program* proposes to reinstall the principle of subsidiarity through the provision of a new political pact. In confronting the colonial Guatemalan class contradictions and understanding space segregation, the *Posconflicto* Laboratory builds upon the legacy of the 1970s debate between Carlos Guzmán Böckler and Jean-Loup Herbert, and Severo Martínez Peláez. The laboratory also considers the synthetic positions by Mario Payeras and Rodrigo Asturias elementary in interpreting class and ethnic contradictions and the complexities of racism present in the Guatemalan post-conflict political subject. To rethink labor today, we need to acknowledge that production has shifted—in contradicting and superimposed manifestations—from the colonial space of the *latifundio* and the *maquila*, to the diffused low and middle neoliberal space of the city itself. Production, the generic and irreducible form of labor, lies at the core of the post-conflict Central American city. In 1927, in rethinking the project of the city, Ludwig Hilberseimer published *Grossstadtarchitektur* and noted: "Metropolisarchitecture is considerably dependent on solving two factors: the individual cell of the room and the collective urban organism."³⁰ For Manfredo Tafuri, Hilberseimer understood the unity of the capitalist city in its identity as an enormous "social machine," an apparatus in which the *cell* or type, and not the overall image of the city represents the starting point for urban design.³¹ It is in the city as economic cycle that *the generic*, embedded in the processing of types, may be reproduced infinitely. Hilberseimer did not seek to invent original forms, but rather found the potential in the production of new types (although he never used the word type) in simple forms that corresponded to a highly original combination of different archetypes.³² Building upon this legacy, the *Productive Housing Program*—starting from the cell or type—combines dwelling and spaces of production interrelated with the city's emerging economies. As a large-scale initiative, the project proposes a productive housing archetype composed by a community development center, a patio-portico and a housing prototype or *cell*, capable of adapting to different urban fabrics and densities. It is precisely in the archetype's generic form that it enables the collectively self-managed housing prototype or cell to inform the economic model's operations—and the possibility to counter urban segregation—fostering a growing tendency for Project A cells to become part of Project B, and Project B cells to become part of Project A. As in Lafayette Park, the Productive Housing Program confronts private property's ever-expanding urban segregation and "pacifying" force, operating within and against urbanization. Architecture, in its potential, becomes an architecture of the city in post-conflict Central America.

Image is based on the map
"Central America, the West Indies,
South America, and portions of
the United States and Mexico,"
(Boston: United Fruit Company,
1909). A neocolonial archetype,
UFCO operated for more than 100
years as an unrivaled corporate
monopoly in Central America,
controlling vast territories,
communications and transpor-
tation networks, and ultimately
the internal politics of the
banana republics.
© a—c—t—a



“Posconflicto Laboratory: Making City + Productive Housing Program in Guatemala & Central America” is a project by URBANÍSTICA—Empresa Metropolitana de Vivienda y Desarrollo Urbano and Asociación Centroamericana Taller de Arquitectura (a—c—t—a).

As a collective initiative, we recognize a collective authorship:

Direction: Roberto Soundy and Álvaro Véliz;
Deputy-Direction: Rossana García Ovalle and Silvia García Vettorazzi; Urban Management: Ana Cintrón;
Housing Program: Eva Campos; CounterSite General Design: Erick Mazariegos; Communications: Werner Solórzano; Design Participants: Frank Carrascoza, Gustavo González, Hans Schwarz, Felipe Vásquez and Jorge Villatoro. Other Collaborators: Rafael Aycinena, Diego Castillo, Mónica Santos and Emilio Vargas.

Posconflicto Laboratory is at the same time a project and a collective long-span research platform, organized as an inter-institutional and transdisciplinary space centered on housing and post-conflict Central America.

posconflicto-laboratory.org

LEFT

Project A's *productive housing archetype* or self-managed cooperative operations in Guatemala City, and the Central American capital cities: Belmopan, San Salvador, Tegucigalpa, Managua, San José and Panama City. © *Posconflicto Laboratory*

RIGHT

Project B's *productive housing archetype* or market operations in Guatemala City, and the Central American capital cities: Belmopan, San Salvador, Tegucigalpa, Managua, San José and Panama City. © *Posconflicto Laboratory*



- 1 Roque Dalton's *Acta* (El Salvador, 1961; trans. Carrie Comer, 2011) in its accusation of deprival, anticipates Central America's armed conflicts during the (very much heated) Cold War. In a post-conflict political context, the *Posconflicto* Laboratory believes the city as a project of productive cohabitation is fundamental to providing critical meaning to the 1996 Guatemalan Peace Accords.
- 2 Several armed conflicts took place in Central America during the last three decades of the 20th century (Guatemala 1960-1996, Nicaragua 1974-1990, El Salvador 1980-1992) leaving more than 330,000 people dead. Although armed conflicts in the region have ended with peace accords, many of their originating causes remain unaddressed.
- 3 One of the highest housing shortages in Latin America, Guatemala presents a 67% housing deficit in a country of 15 million inhabitants. Guatemala City (not metropolitan) presents a 16% quantitative deficit and a 34% qualitative deficit from an estimated 1 million inhabitants (IADB, *Room for Development: Housing Markets in Latin America and the Caribbean*, 2012).
- 4 On February 1, 2012, a *Posconflicto* Laboratory breakthrough, the *Empresa Metropolitana de Vivienda y Desarrollo Urbano* was created by the Guatemala City Municipal Council.
- 5 Prior to the signing of the Peace Accords of December 29, 1996, an agreement was reached by the Government of Guatemala and the URNG (*Unidad Revolucionaria Nacional Guatemalteca*) with the Social and Economic Accords signed in Mexico City on May 6, 1996: "It is recognized the need to carry out, in accordance with the constitutional mandate, a promoting policy with priority in the construction of affordable housing by means of adequate financial systems, so that Guatemalan families may enjoy them as property;" (II.D.25.) "... to allow access of the poor to housing with services and hygiene and environmental sustainability;" (II.D.25.a.) in addition to being "coordinated with municipalities of the country so that there be homogenous, clear and simple construction and supervision norms, following good quality and adequate housing security." (II.D.25.b.)
- 6 The Housing Law was approved by the Guatemalan Congress on February 2012 (Decree 09-2012). While the Housing Law manifests the right to housing and emphasizes the need to guarantee adequate housing, and not partial "housing solutions," it failed to pass one of the key debated elements for its operation: the housing land bank.
- 7 *Preconflicto*, composed by a—c—t—a at the Berlage Institute in Rotterdam, 2011.
- 8 Charles Waldheim, "Notes Toward a History of Agrarian Urbanism," in Bracket 1: On Farming, ed. Mason White and Maya Przybylski (Barcelona: Actar, 2010), 18-24.
- 9 Manfredo Tafuri, "Toward a Critique of Architectural Ideology," in *Architecture Theory Since 1968*, trans. Stephen Sartarelli; ed. K. Michael Hays (Cambridge: The MIT Press, 1998), 6-35.
- 10 Ibid., 22.
- 11 Pier Vittorio Aureli, "In Hilberseimer's Footsteps," in *Metropolisarchitecture and Selected Essays*, Ludwig Hilberseimer, trans. Richard Anderson (New York: GSAPP Books, 2012), 359. Aureli contrasts Hilberseimer's belief of reforming the organizational space of production by capitalist development, to Rem Koolhaas' non-formalist and non-deterministic appropriation of Hilberseimer's work.
- 12 *El Imparcial*. 09/26/53, 1. In 1953, the UCL with the intermediation of deputy members of PAR, PRG, and PGT proposed an initiative in Congress for urban reform. In the political aftermath of the 1952 Agrarian Reform decree, the initiative was soon dismantled after being deemed "communist" by developers.
- 13 Carlos Guzmán Böckler and Jean-Loup Herbert, Guatemala: *Una interpretación histórico-social*, (Mexico City: Siglo XXI editores, 1970), 45.
- 14 As opposed to the *mestizos*, the *ladinos* are a colonial construction.
- 15 As opposed to the natives, the *indios* are a colonial construction.
- 16 Severo Martínez Peláez, *La patria del criollo. Ensayo de interpretación de la realidad colonial guatemalteca* [1970] (Mexico City: Fondo de Cultura Económica, 1998), 510. To illustrate this point, Martínez Peláez states that Pedro de Alvarado, Spanish conquistador and governor of Guatemala, never saw a single *indio* in his life. Everywhere Alvarado went he saw native people, including native people who were enslaved.
- 17 A large and privately owned land-holding, the *latifundio* formed the basis of the colonial economy.
- 18 On May 10, 2013 former Guatemalan military dictator Efraín Ríos Montt was found guilty of genocide and crimes against humanity, the first time that a head of state has been convicted of genocide in a national court. Days later, the ruling was overturned on procedural grounds. A new trial is scheduled for January 2015.
- 19 On this debate, see: Marta Elena Casaús Arzú, La reconceptualización del racismo y de la discriminación en Guatemala: principales aportes de las élites ladinas y mayas: 1950-2006. "First Conference on Ethnicity, Race and Indigenous Peoples in Latin America & the Caribbean," University of California, San Diego (UCSD), 2008.
- 20 Mario Payeras, *Los pueblos indígenas y la revolución guatemalteca. Ensayos étnicos. 1982-1992*. (Guatemala: Luna y Sol, 1997), 87.
- 21 Rodrigo Asturias, *La verdadera magnitud del racismo*, (ORPA, 1978). Asturias argues against a binary classification of society, writing while living in clandestinity. Rodrigo Asturias is also known as Gaspar Ilom, commander and founder of ORPA (*Organización del Pueblo en Armas*).
- 22 Labor as defined in "Athens: Labor, City and Architecture. Towards a Common Architectural Language," a collective research-based studio led by Pier Vittorio Aureli and Elia Zenghelis, in collaboration with Maria S. Giudici and Platon Issaias and with the participation of Juan Carlos Aristizábal, Hyun Soo Kim, Ivan Nasution, Davide Sacconi, Roberto Soundy, Yuichi Watanabe, Ji Hyun Woo, and Lingxiao Zhang at the Berlage Institute in Rotterdam (2010-2011).
- 23 A neoliberal phenomenon, the *maquila* is an export-based manufacturing operations site in a free trade zone.
- 24 Hannah Arendt, *The Human Condition* (Chicago: The University of Chicago Press, 1958), 7. In referring to the Greek polis, Arendt identified clearly separated spheres: the *agora* as the space of the political, and the *oikia* as the space of labor reproduction.
- 25 Karl Marx, *Capital*, vol. I [1867], trans. Ben Fowkes (London: Penguin Books, 1990), 270. Labor-power is conceived as capabilities, something that does not exist as a tangible form of production. It is a generic and undetermined potential: the human faculty itself.
- 26 Karl Marx, *Grundrisse* [1858] (London: Penguin Books, 1974), 706. According to Marx, in a capitalist society the development of the *general intellect* manifests in the control of the social life process, effectively subsuming labor to capital.
- 27 Paolo Virno, *A Grammar of the Multitude* (Los Angeles: Semiotext[e], 2004), 82-3. According to Virno, when production's potential is exchanged as a commodity, it is no longer possible to distinguish it from the subject's life itself. The main mode of production has shifted from the production of goods to the production of knowledge, or immaterial work, where the most fundamental and generic human faculties—such as speaking and thinking—are at the core of contemporary production.
- 28 *The generic*, a fundamental category of the post-Fordist city, as proposed in "Athens: Labor, City and Architecture. Towards a Common Architectural Language," Berlage Institute, Rotterdam (2010-2011). See note 21.
- 29 Byron Mármol and *Posconflicto* Laboratory, "More about less and less about more" video portraits, 2012. The production of the videos became instrumental in the debate on rethinking the Guatemalan post-conflict political subject.
- 30 Ludwig Hilberseimer, *Metropolisarchitecture and Selected Essays*, trans. Richard Anderson (New York: GSAPP Books, 2012), 270. In his lucid and realist analysis of the capitalist city, Hilberseimer is keen to understand that the overall organization of the city is dependent on the organization of the single unit or cell.
- 31 Manfredo Tafuri, "Toward a Critique of Architectural Ideology," in *Architecture Theory Since 1968*, trans. Stephen Sartarelli; ed. K. Michael Hays (Cambridge: The MIT Press, 1998), 21. To Tafuri, Hilberseimer's cell or type allows it to be analyzed in its abstraction and resolved as a foundational structure in a production program.
- 32 Pier Vittorio Aureli, "In Hilberseimer's Footsteps," in *Metropolisarchitecture and Selected Essays*, Ludwig Hilberseimer, trans. Richard Anderson (New York: GSAPP Books, 2012), 334.



Time Tracker

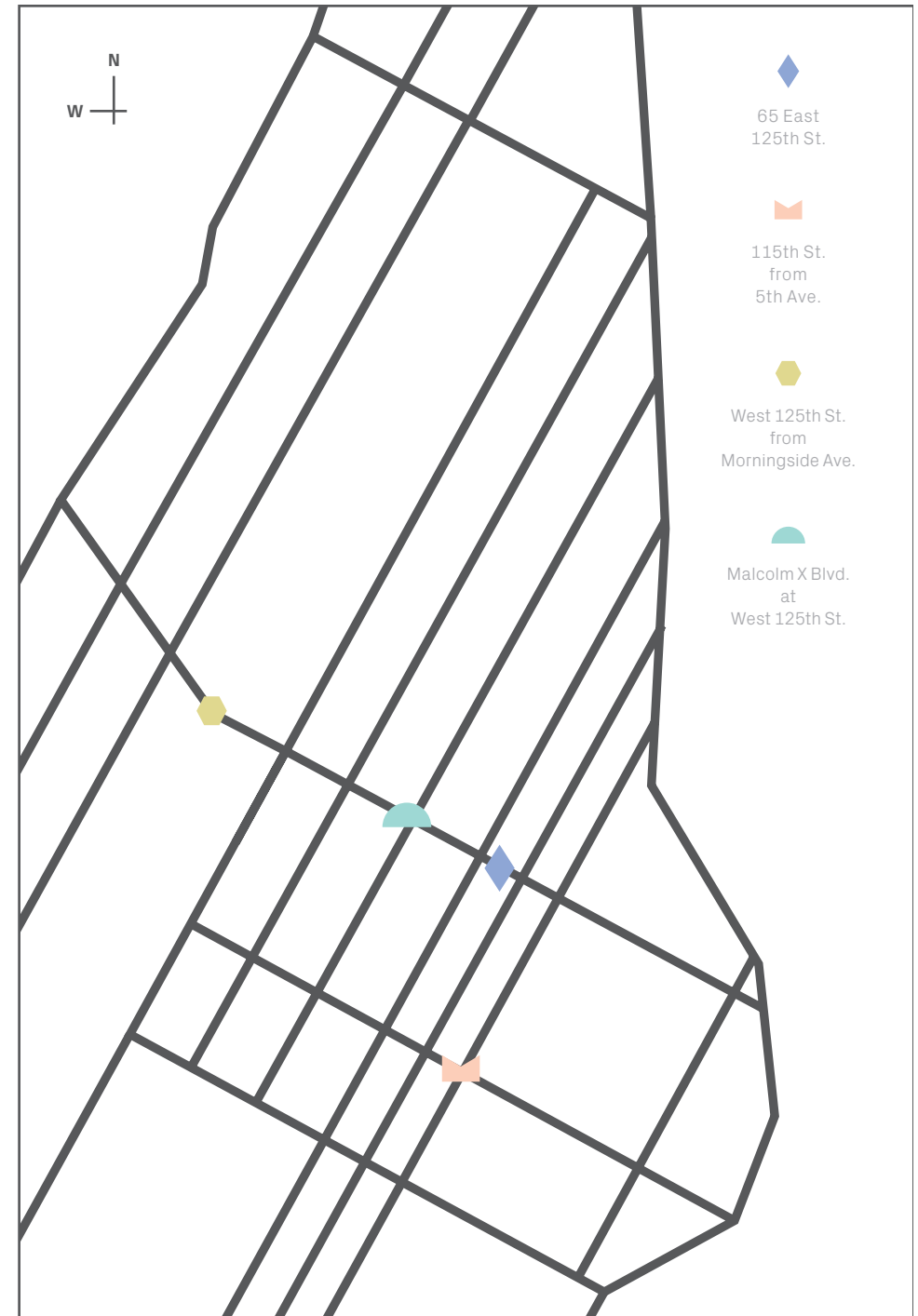
Text and photographs by Camilo José Vergara



1980

For more than a century, Harlem has been the epicenter of black America, the celebrated heart of African American life and culture. But it has also been a byword and symbol for the social and economic problems that have long plagued inner-city neighborhoods: poverty, crime, disinvestment, and decay.

The award-winning photographer Camilo José Vergara has walked the streets and chronicled Harlem for forty-three years, revealing a story of hard times, decline, struggle, and accomplishment. Repeatedly returning to the same locations over many decades, Vergara reveals a community in constant evolution—some areas decline as longtime businesses give way to empty storefronts, graffiti, and garbage, while others gentrify with corporate chain stores competing with local mom-and-pop enterprises. His book *Harlem: The Unmaking of a Ghetto* is at once an unprecedented visual record of urban transformation and personal exploration.



FOR MORE THAN FOUR DECADES I HAVE DEVOTED MYSELF TO

photographing and documenting the poorest and most segregated communities in urban America. I feel that a people's past, including their accomplishments, aspirations, and failures, are reflected less in the faces of those who live in these neighborhoods than in the material, built environment in which they move and modify over time. Photography for me is a tool for continuously asking questions, for understanding the spirit of a place, and, as I have discovered over time, for loving and appreciating cities.

My focus is on established East Coast cities such as New York, Newark, and Camden; rust belt cities of the Midwest such as Detroit and Chicago; and Los Angeles and Richmond, California. I have photographed urban America systematically, frequently returning to re-photograph these cities over time. Along the way I became a historically conscious documentarian, an archivist of decline, a photographer of walls, buildings, and city blocks. Bricks, signs, trees, and sidewalks have spoken to me the most truthfully and eloquently about urban reality.

I did not want to limit the scope of my documentation to places and scenes that captured my interest merely because they immediately resonated with my personality. In my struggle to make as complete and objective a portrait of American inner cities as I could, I developed a method to document entire neighborhoods and then return year after year to re-photograph the same places over time and from different heights, blanketing entire communities with images. Studying my growing archive, I discover fragments of stories and urban themes in need of definition and further exploration. Wishing to keep the documentation open, I include places such as empty lots, which as segments of a sequence become revealing. I observe photographic sequences to discover how places evolve, and to formulate questions. I write down observations, interview residents and scholars, and make comparisons with similar photographs I had taken in other cities. Photographs taken from different levels and angles, with perspective-corrected lenses, form a dense web of images, a visual record of these neighborhoods over time.

My photographic archive of poor, minority communities across the country evolved over decades. The stages can be divided according to the film and type of camera used. In the early 1970s, as a street photographer who focused on people, I used High Speed Ektachrome. Then, as I concentrated on time-lapse photography of the urban fabric, I turned to Kodachrome 64, a stable color film that came out in the mid-1970s. In combination with a small 35 mm camera, it provided me with the medium speed and fine grain emulsion appropriate for creating a lasting archive of buildings and city blocks. After it was discontinued in 2010,

Fujichrome Provia 100 became my film of choice. I have used it concurrently with digital photography since 2005. For quick access to my collection I have made a selection of 2,500 digital images and archived them using Adobe LightRoom, which provides a system for organizing my digital collection according to place, time, and subjects. It is also invaluable for gathering images to update, as well as to prepare articles, books, and exhibitions.

After 2000 my documentation entered a new phase. I began to do web searches of words, themes, and addresses. With a simple search on Google for a particular location, I was able to find newspaper and magazine articles, religious pamphlets, student papers, announcements for conferences, and political meetings that enriched the context of my research and prompted me to ask fresh questions and take new photographs. I discovered information about people who lived in the locations I photographed, read about events such as crimes, fires, and stores and institutions coming in or abandoning the area, and learned about historical events that had taken place nearby. After the appearance of Google Maps (2005) and Google Street View (2007), these became important research tools, allowing me to revisit the locations of my photographs and to go beyond the frames of the images to explore the streets around them. Whenever in doubt about the location of an image, I search for the correct address with Google Satellite or Street View.

I am a builder of virtual cities. I think of my images as bricks that, when placed next to each other, reveal shapes and meanings of neglected urban communities.



1977



1978



1981



1990



1994



1998



2001



2011



1988



2008



1988



2000



2009



2011

1989



1993



2000



2001



2003



2005



2006



2007



2011



10 Rorschach Images Project by Ana Miljacki, Lee Moreau, and Sarah Hirschman



Project_Rorschach**Project_:**

Ana Miljacki, Lee Moreau,
and Sarah Hirschman

Team:

Oliver Wuttig,
Alexander William Marshall,
Andrew Manto,
Sean Capone
(The Supernature),
George Xinxin Lin,
Clay Anderson,
Bill Gastrock, and
Chirani Prateepasen

Exhibition_Contents**Cards**

10 takeaway Rorschach-
inspired cards

Projection

Animation transitions
between the ten composite
Rorschach images

Bench

Large custom bench
(derived from Gerrit
Rietveld's Z chair and
his Red/Blue chaise
lounge) serves as seating
and card display

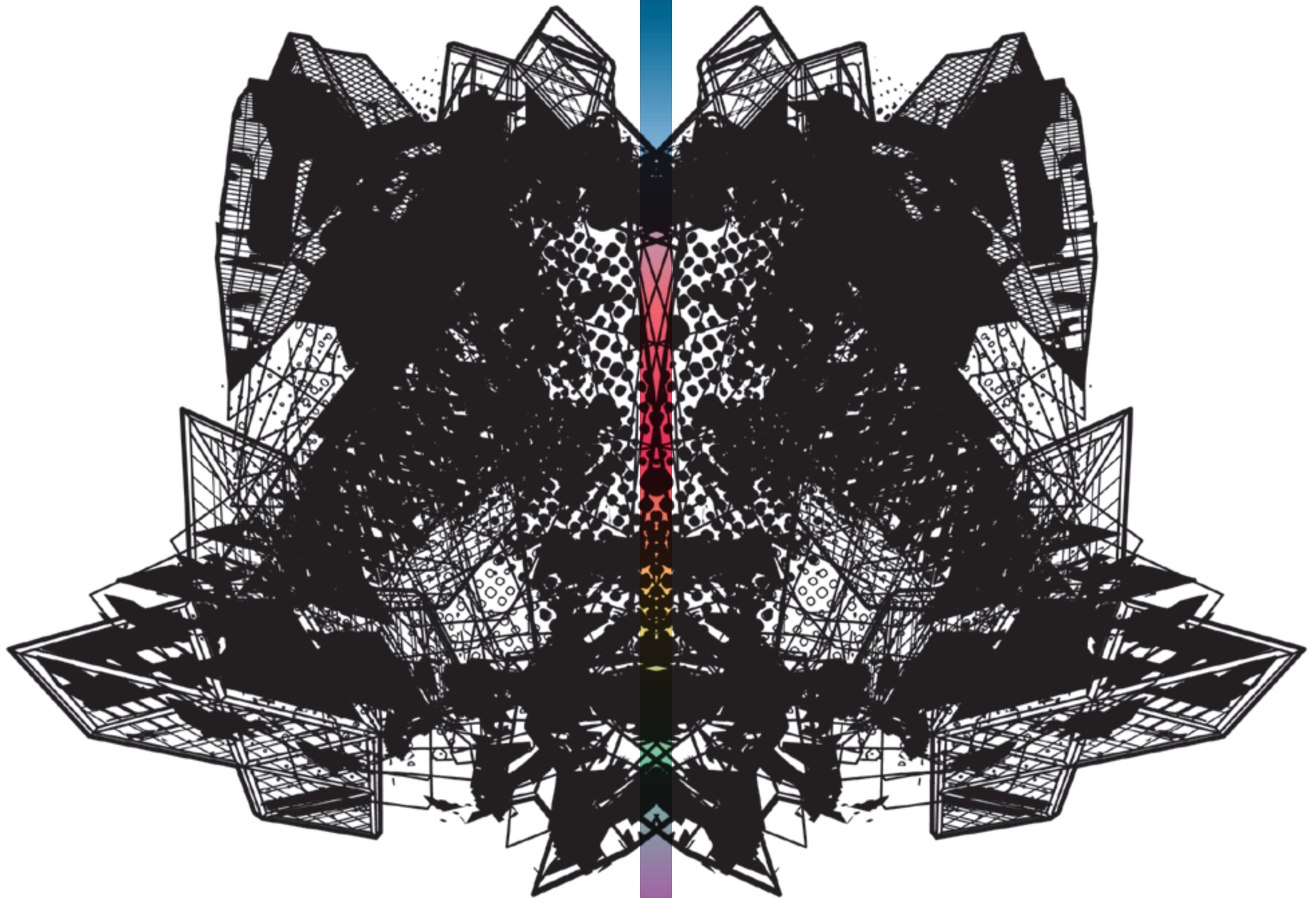


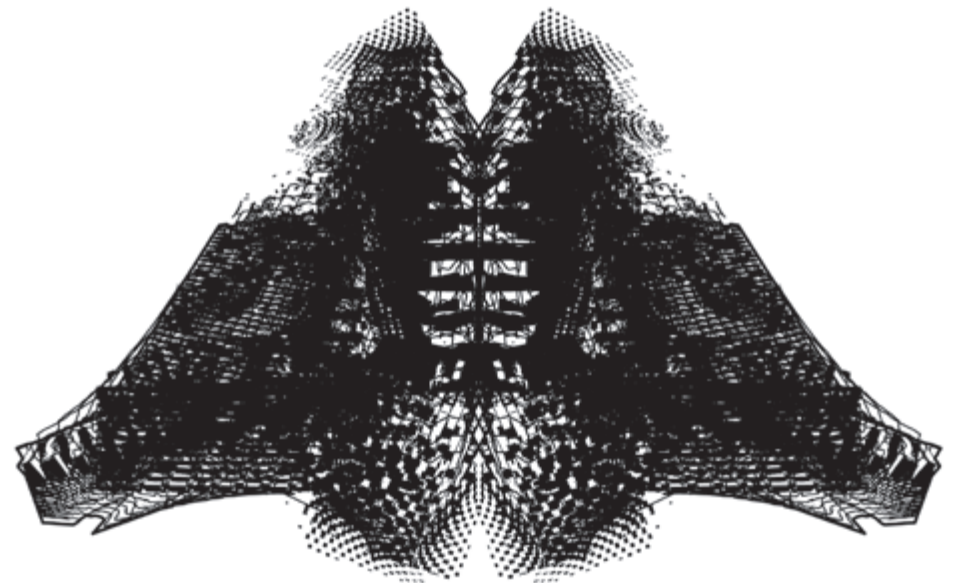
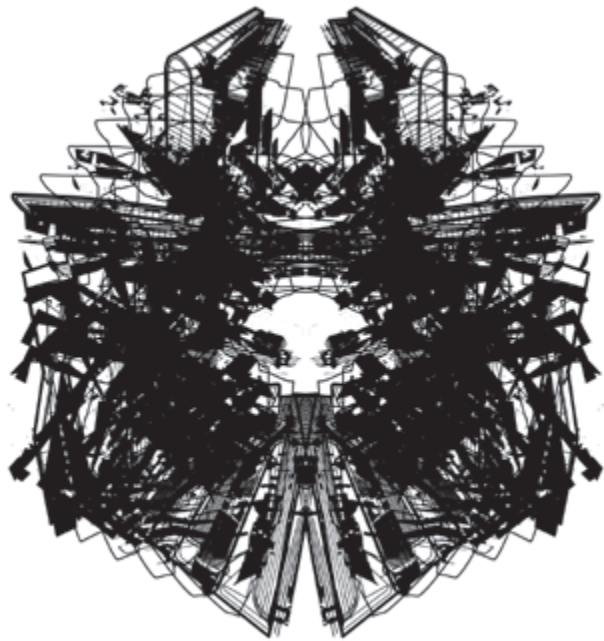
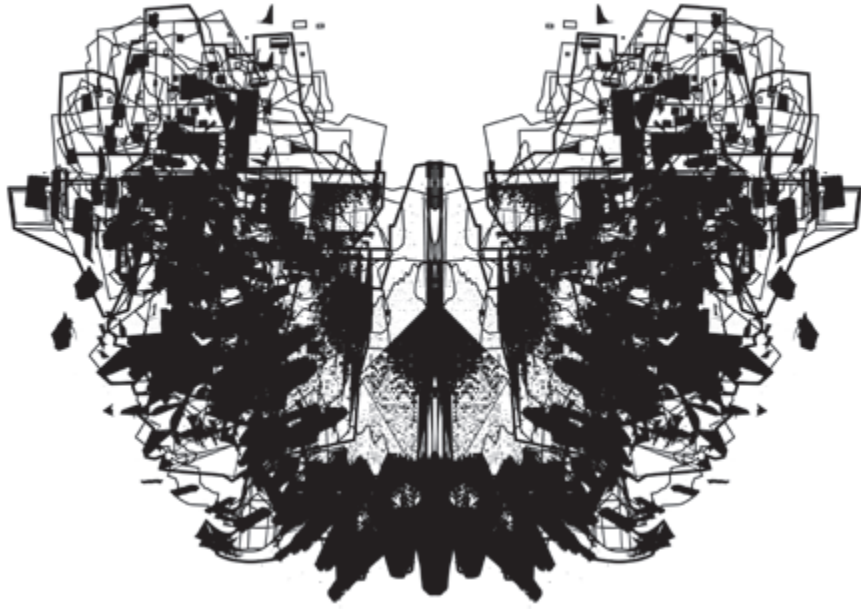
Project_Rorschach is a series of ten cards that compile architectural imagery from digital archives in a manner inspired by the ten cards used in the Rorschach inkblot test. It was first exhibited at the Design Biennial Boston from February – May 2013, and was curated by over,under at the BSA Space, the exhibition space of the Boston Society of Architects in Boston, MA.

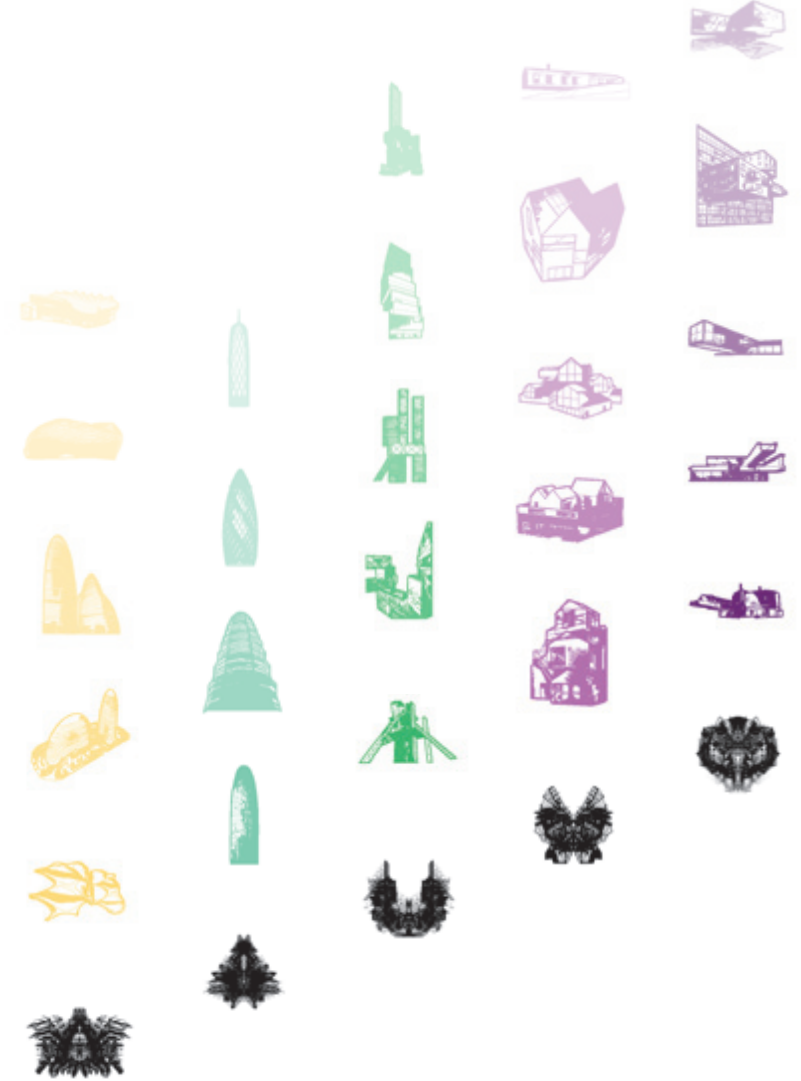
Once meticulously printed on a single antique press in Switzerland, the Rorschach images were sold only to licensed therapists. Having run out of copyright protection in the US, the test images are now available on Wikipedia for all to contemplate. We employ a reference to them as an invitation to follow and see (anew) images of contemporary architectural tropes.

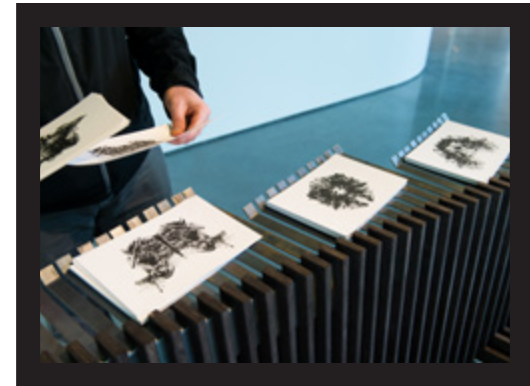
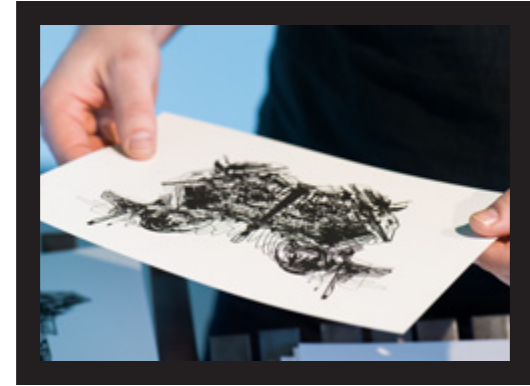
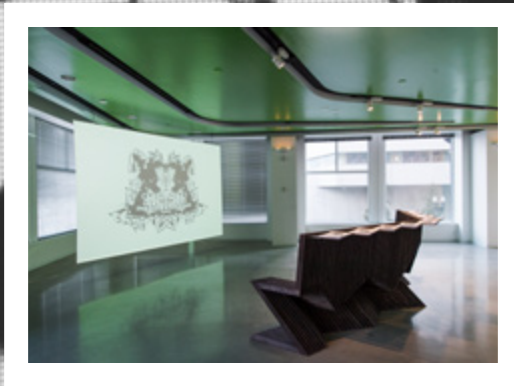
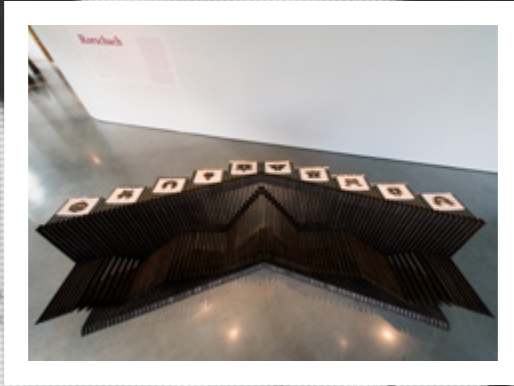
Grouped by meme, ubiquitous images of architecture are layered into ten revised Rorschach cards. No longer inkblots, but retaining the symmetry that was originally constitutive of their figuration, the architectural Rorschach images are super-saturated compositions of chimneys, robotic bricks, cantilevers, house piles, hyper-towers, circles, phalluses, beanie blobs, single surfaces, diagrids, and stacks. They are assembled from the digital archives that designers draw on when thirsty—such as Archinect, ArchDaily, or Dezeen—and reproduced here in the low-res flatness that is their currency.

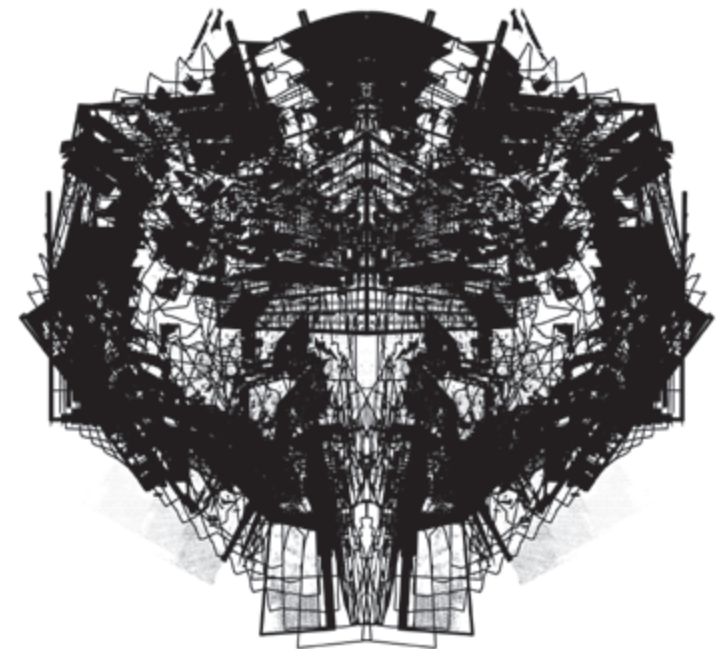
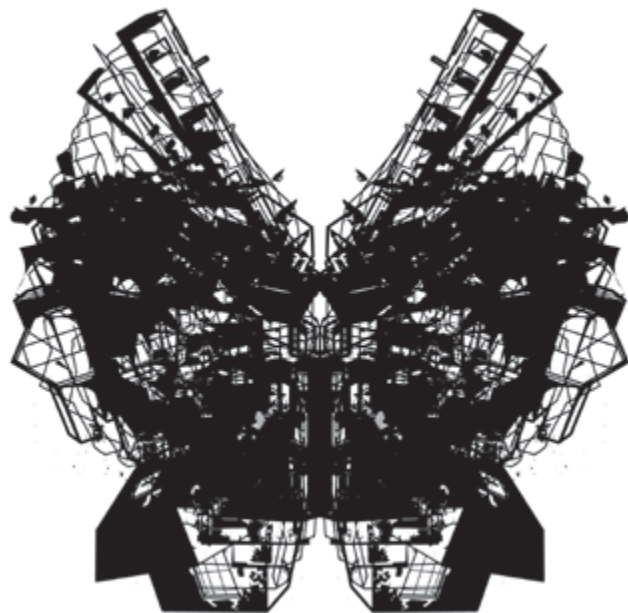
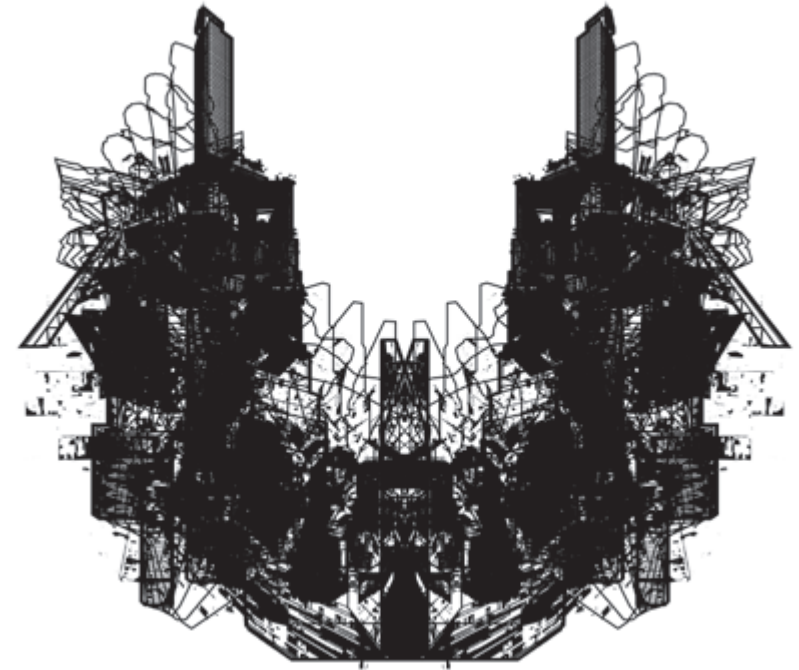
This project invites architectural self-analysis while it simultaneously plays on the fact that the discipline of architecture is constituted, multiplied, and advanced from constant projections onto its own archives. Although the inkblot revisions still might send the “chance image” signal, Project_Rorschach does not provide any means for authorial evaluation of the imaginations projected onto it. It speaks instead, and hopefully propels further, into an open-ended string of interpretations—some of architecture’s contemporary haunts.

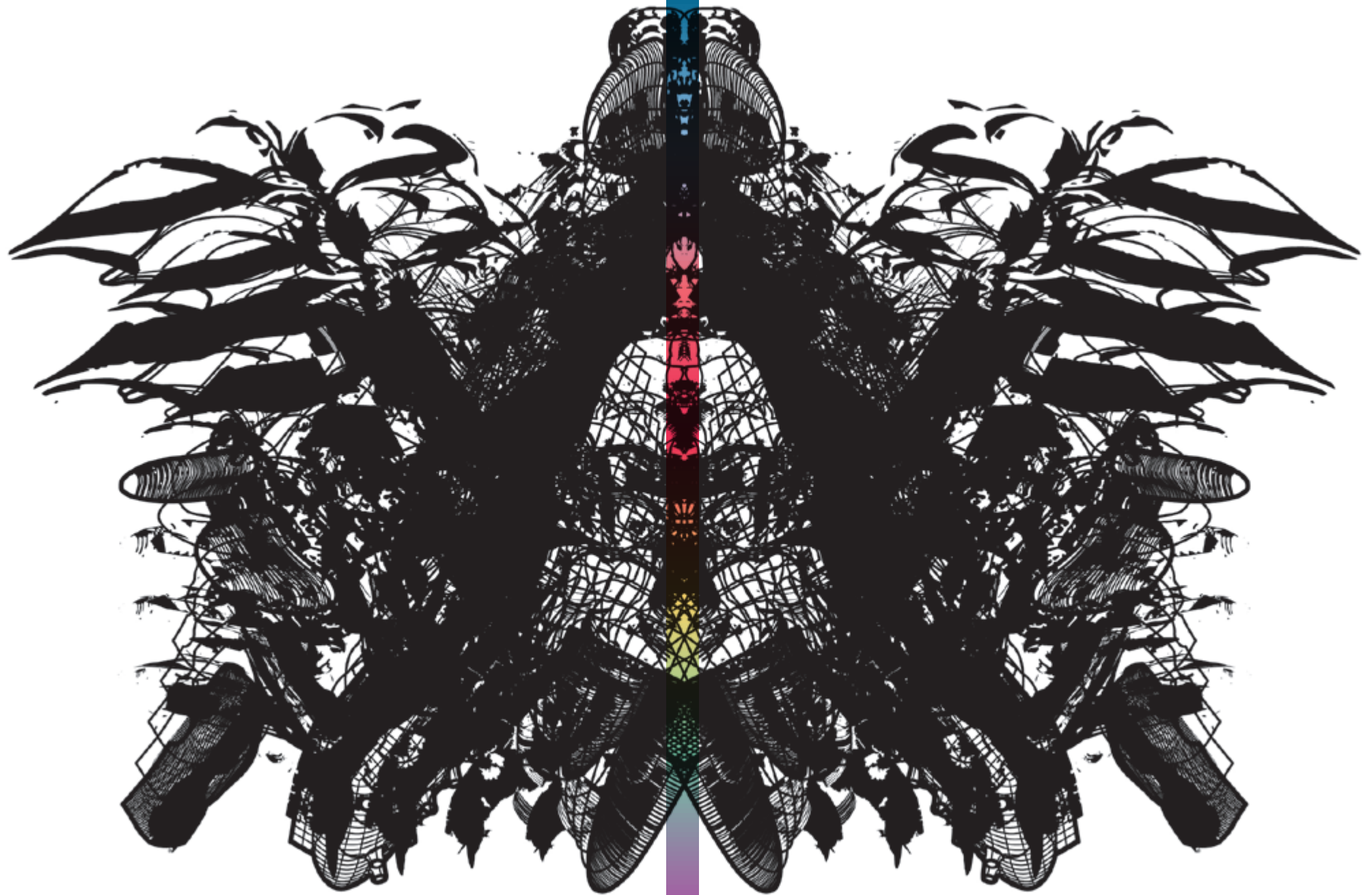












TYPO

Project by NEMESTUDIO



TYPO ⁸
 is a **provocation.**
 It is a
speculative design project
 for the
 city of **Istanbul.**

The TYPO project proposes a network of Campus Commons, a new type of spatial organization and institutional framework for the university campuses in Istanbul. Positioned along the existing and future lines of major rail transit stops (subways, light rails, suburban trains), Campus Commons is a new type of collective space that contains spaces for the university programs as well as other public amenities. While proposing a renewed dialogue between large scale interventions and territorial networks through TYPO-logical investigation, the project speculates on specific architectural interactions between scale and form through various experiments on territorial legibility, repetition, and iconicity.

The larger ambition of the project is an investigation on the role of architecture at the scale of territory. It consists of the territorial collection of three types of punctual interventions and their further typological variation for particular sites in Istanbul. Rather than endless differentiation on a particular type, the language of the typological repetition is based on each intervention's contextual specificity. Thus, the term TYPO has the double connotation of TYPE as repetitive variation and TYPO as unexpected error or divergence from norm. The unity among various interventions is achieved via the reduction within the formal language of the project as a whole.

In distinction from the current preoccupation with complex geometries and sustainability agendas that reduce form to an automatic consequence of processes and systems (be it environmental, infrastructural, or parametric), TYPO experiments on a more nuanced relationship between abstraction and realism. It strives for a new primitive.

THE BOSPHORUS STRAIT

THE MARMARA SEA

3
 40°
 29°
 Eleva

**The TYPD project
puts forward three
propositions**

Proposition 1 Instead of a master plan, the TYPD project proposes the idea of Master Framework. Master Framework is situated between two known models of urban design: a master plan (e.g. Lucio Costa's Brasília) and a collection of point interventions (e.g. Mathias Ungers's Green Archipelago for Berlin). Master Framework accommodates certain features of both models but proposes a completely new approach. Similar to a master plan, a Master Framework aims at a unifying and legible framework; however, unlike a master plan that totalizes a closed system, a Master Framework offers an open and flexible framework. Similar to a collection of point interventions, a Master Framework is comprised of context-specific multiples; however, unlike point interventions, the system aims at a coherent and legible framework.

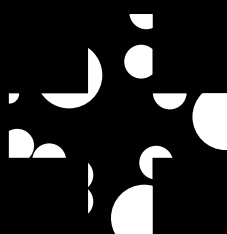
Master Plan
Lucio Costa's Brasília



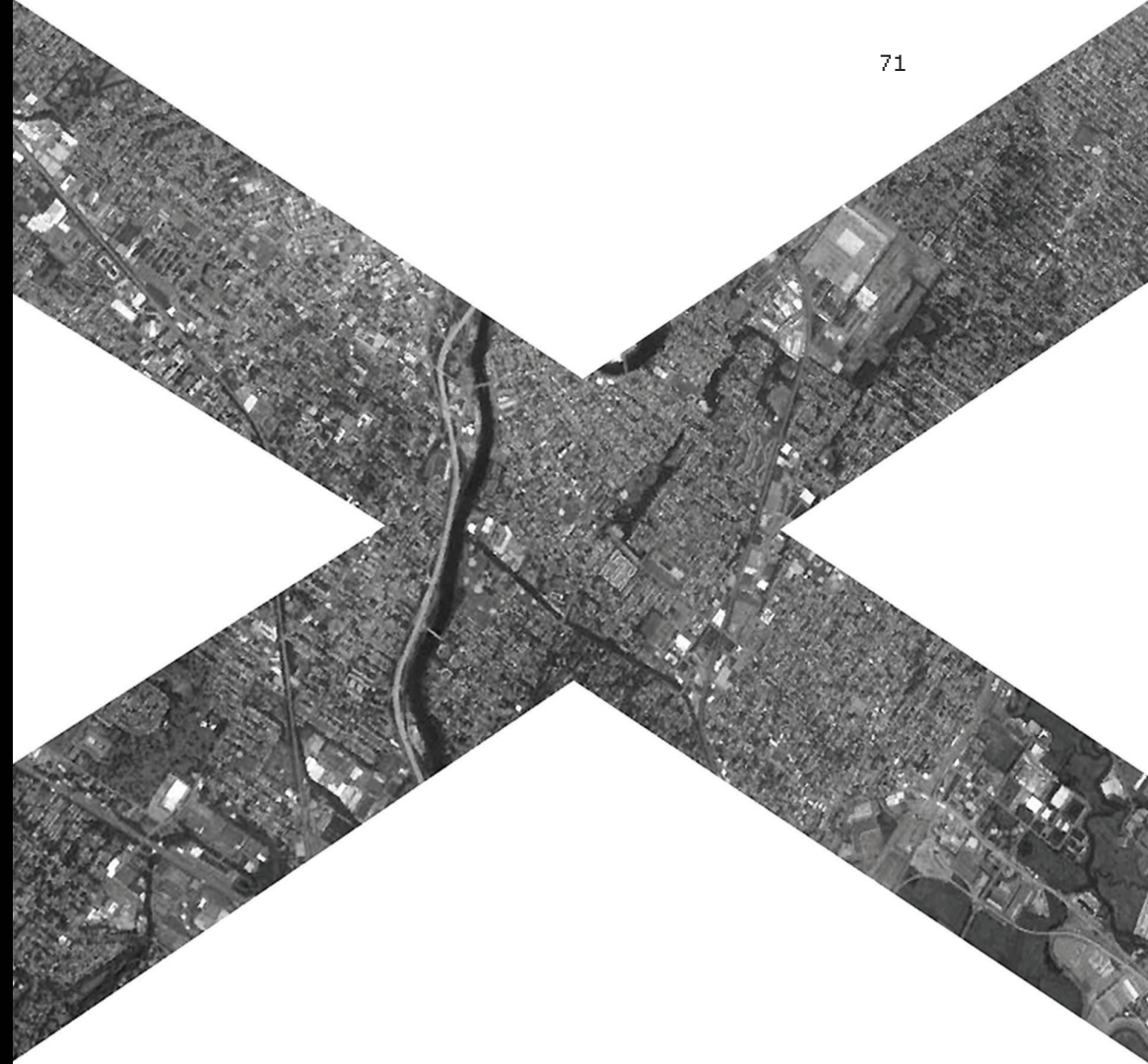
Point Intervention
Mathias Ungers's
Green Archipelago



Master Framework



Proposition 2 The TYPD project is a true believer of icons at the scale of territory. In contemporary architecture, iconicity is either reduced to the fantastic Bilbao Effect or to the degrading of the icon altogether. In contrast, TYPD asserts that territories can have forms; they can offer a very different level of legibility and iconicity.



Proposition 3 Campus Commons offers a new model of spatial organization and institutional framework for the role of university campuses in the city. Until 1980s, all education in Turkey was public and private higher education was unconstitutional. The constitutional amendment of 1981 allowed private foundations to establish universities; and after that, the growth of new private universities accelerated, mostly concentrated in big cities. In Istanbul alone, there are 8 public and 30 private universities (number expected to rise in the following years). In this context, the Campus Commons project proposes a new framework, in which the public (State) and private sponsors (private foundations) collaborate on a new university model. The government land is leased to private universities with the condition that they share resources and provide spaces for public universities in return. In contrast to a typical university model, where various disciplines (and related departments) disperse throughout the city under each university, Campus Commons are a cluster of university infrastructures that are shared by multiple public and private universities.

Typical University Model

University A



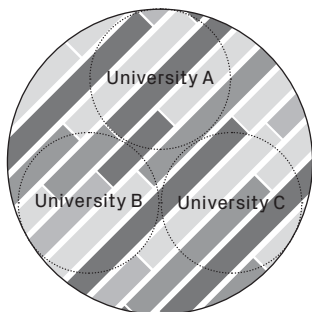
University B



University C



New Institutional Model



30 Private Universities

Community

73

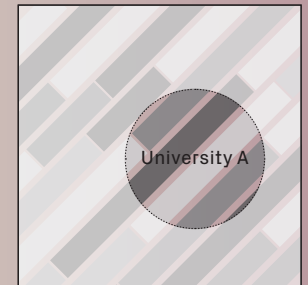
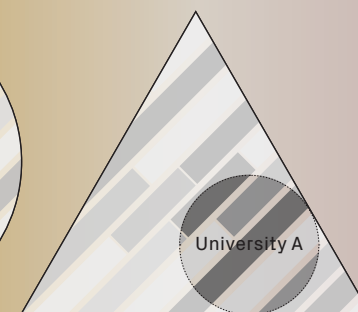
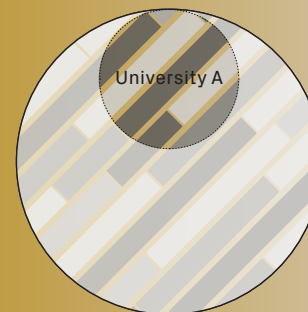
Shared
Knowledge
Resources
Space

8 Public Universities

Campus Commons 1

Campus Commons 2

Campus Commons 3



Situated along the stops of the existing and future stops of major rail transit networks, the project works through variations of three site typologies: City, Infrastructural Edge, Ecological Terrain.

Each site typology includes percentages of supplementary programs and public facilities. In parallel, each geographic condition frames a specific dimension in relation to the particular program distribution (university, public, and ancillary) and context (city, infrastructure, and ecology). By virtue of its scale of intervention, each Campus Commons projects a particular preservation act for the city. Rather than a typical focus on the preservation of the built, each site typology demarcates a void and announces that area as a public ground of the city.

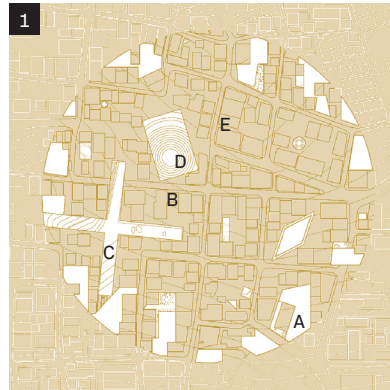
Campus Commons City Series

are composed of three separate interventions, each of which are located in the inner city of Istanbul with distinct existing contexts (residential area, cultural center, and high-density housing area). Each intervention defines a legible territorial frame within the existing context via a collection of individual Campus Commons buildings. This territorial frame not only marks an open and porous edge for the proposed buildings but it also defines a large urban landscape inside itself, which is a new commons for various parks and public programs.

The Program

70% University
20% Public
10% Other

- A Proposed Buildings
- B New Commons
- C Proposed Urban Voids
- D Rail/Metro Stations
- E Existing Buildings



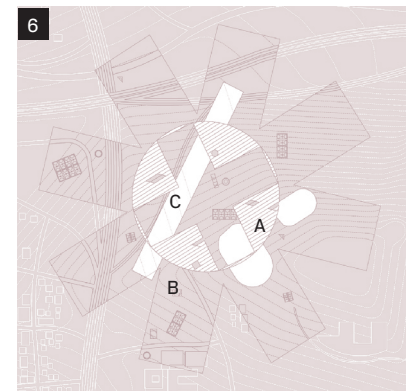
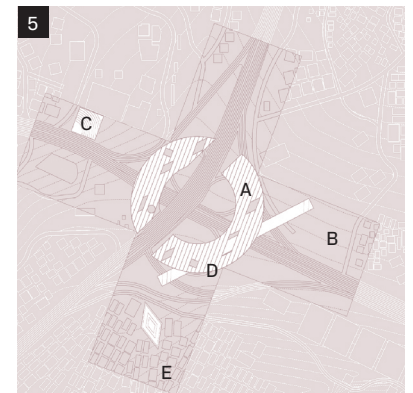
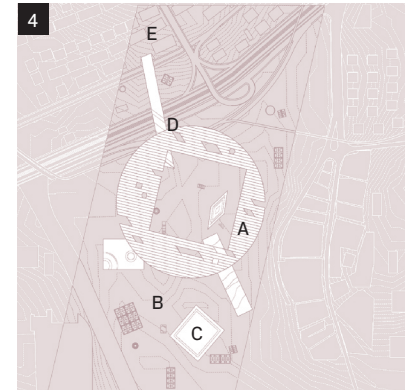
Campus Commons Infrastructural Series

are composed of three separate interventions, each of which are located at the urban edges of Istanbul where a rail network coalesces with a major highway system. Each intervention defines a megaform and houses programs that require large spans as well as major railway stations. Each megaform is situated within a larger territorial area, which accommodates various outdoor activities of the campus, including sports arenas and large city parks.

The Program

50% University
20% Public
30% Other

- A Proposed Buildings
- B New Commons
- C Proposed Urban Voids
- D Rail/Metro Stations
- E Existing Buildings





view of project 4

Campus Commons Ecological Series

are composed of separate interventions, each of which located at the intersection of the future rail stations at the ecological hinterland of Istanbul. The ecological zones of the city are mostly located around the water basins as determined by non-governmental wildlife organizations according to the intensity of biological diversity of fauna and flora. Via the three selected sites, the project marks those areas as terrains of preservation. Enabled especially by the subway connections, Campus Commons Ecological Series propose alternative formulations of wilderness articulated through bio-diversity parks, forests and low-density housing.

The Program
30% University
40% Public
30% Other

7



8



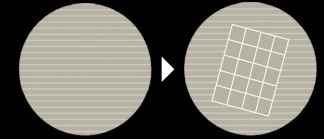
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City Interventions



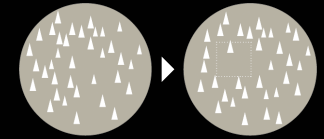
Agriculture Additions



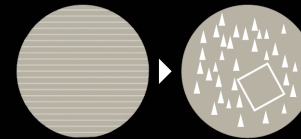
Trail Additions



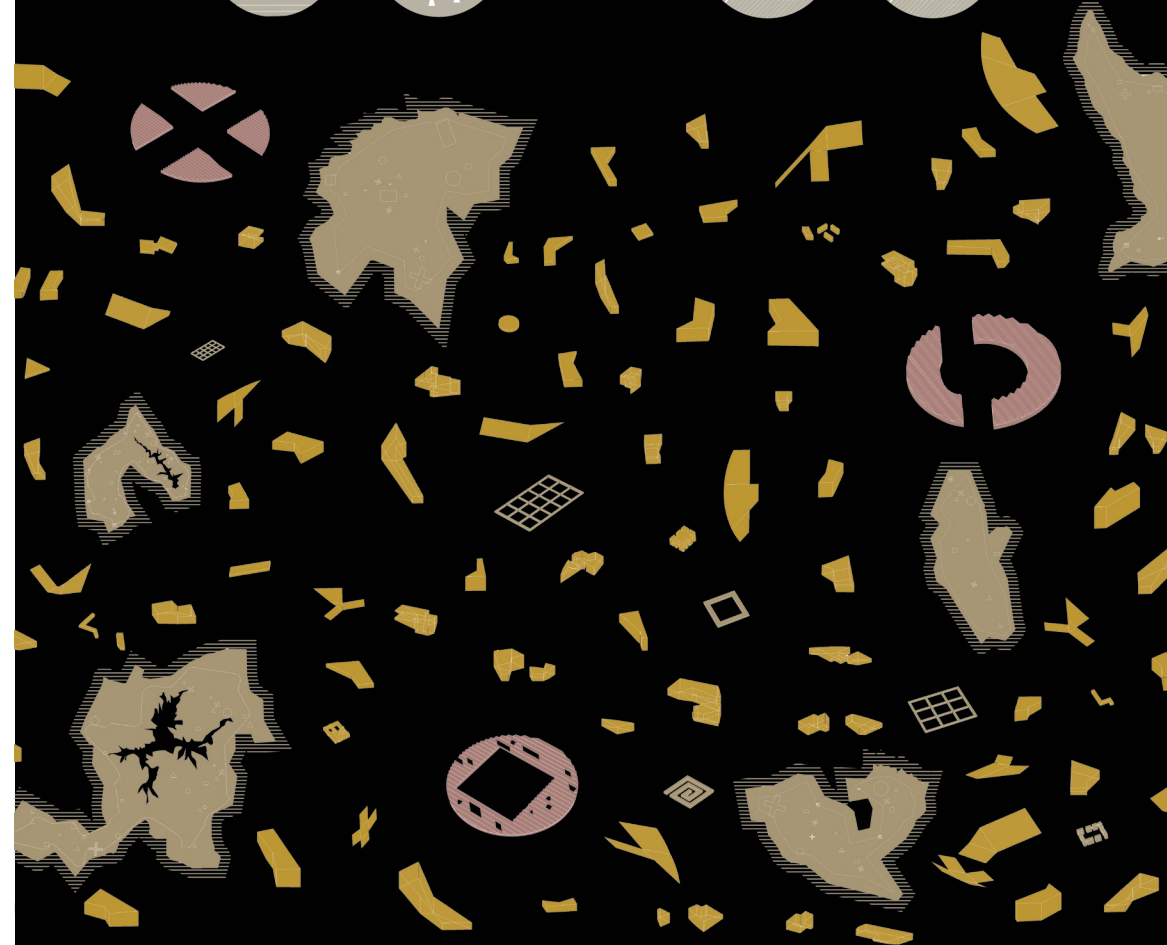
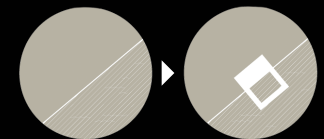
Temporary Interventions



Forest Additions



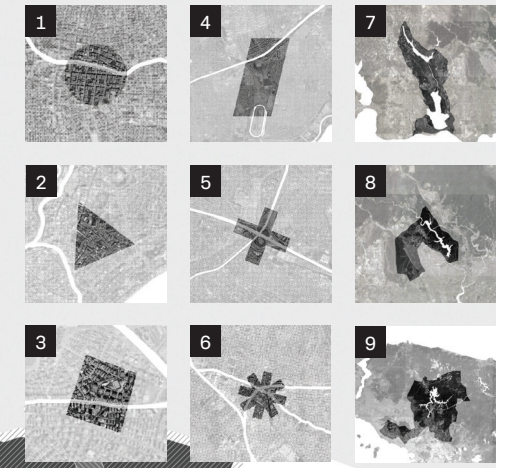
Water Additions



Campus Commons City Series

Campus Commons Infrastructural Series

Campus Commons Ecological Series



Project team:
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Kate Morgan
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An Obituary for the Greek City of Repetition

Essay by Panos Dragonas

Yorgis Yerolymbos,
"Athens Spread."

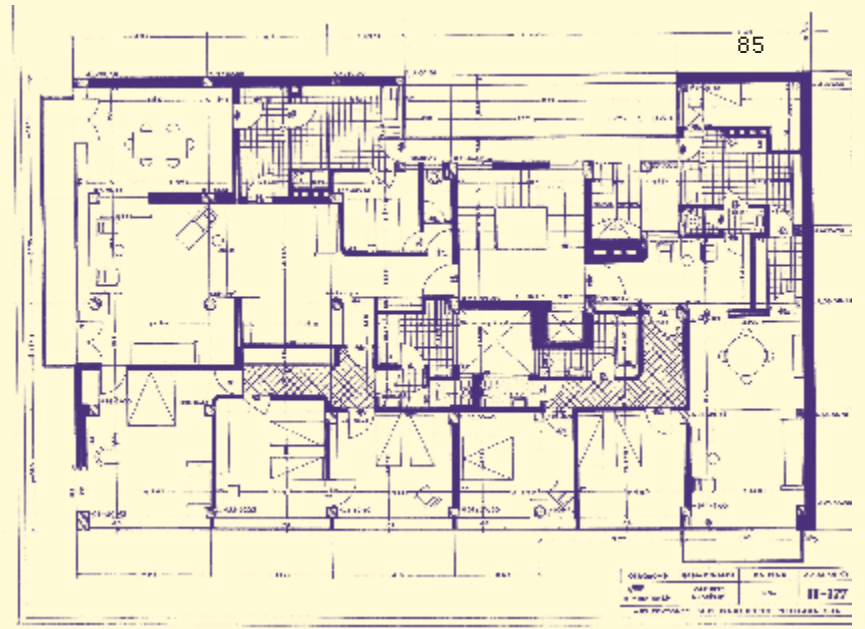


The Birth of the Polykatoikia 1929-1940

Athen's population exploded, from 453,000 in 1920 to 802,000 in 1928, following the arrival of refugees from Asia Minor.¹ This rapid population growth generated an urban expansion in the Greek cities through the creation of informal refugee settlements. During the interwar period, social polarization was evident in Athens. The most important axes of polarization were those between natives and refugees, the rich and the poor.² The refugee settlements were separated into working class districts, while the bourgeois communities still lived at the 19th century neoclassical city center.

OPPOSITE
Thoukydides Valentinis and Polyvios Michailidis, *Polykatoikia at Exarcheia*, 1933-34. Under construction. Source: Savas Condaratos and Wilfried Wang, eds., *Greece: 20th Century Architecture* (Munich: Prestel, 1999).

ABOVE
Thoukydides Valentinis and Polyvios Michailidis, *Polykatoikia at Exarcheia*, 1933-34. Typical floor plan. Source: C Savas Condaratos and Wilfried Wang, eds., *Greece: 20th Century Architecture* (Munich: Prestel, 1999).



A decisive model in the development of Athens was the adoption of the law of horizontal property in 1929, which enabled the invention of the antiparochi system. According to the Greek legislation, the owner of a plot is to be compensated by the contractor who builds on his land with apartments. This unique property-swap system received tax privileges and soon became the principal method of real estate transactions in Greece.

The first multistoried apartment buildings were built in the 1910s, shortly after the introduction of the reinforced concrete technology in Greece. But the Greek apartment building known as the polykatoikia was born in the 1930s.

Designed by a group of young architects—Kyriakos Panayotakos, Vassilios Douras, Georges Kontoleon, Thucydides Valentinis, et al.—connected to the pioneers of the modern movement, these early structures were commissioned by prosperous and cultured landowners who sought social recognition.³

Invented in order to meet the needs of the social and economic elite, the polykatoikia very soon became the dominant building typology and led the massive dissemination of the modern vocabulary in the Greek city.

The Greek City of Repetition 1949-1989

World War II (1940-1944) destroyed Greece. Moreover, the Civil War that followed (1946-1949) cast a long shadow over the local society. The social and ideological differences of the interwar period were accentuated during the early stages of the Civil War, when Athens was divided among the conflicting parties. Combating communism was one of the main objectives of the post-war governments.

Between 1951 and 1981, the population of the Athens urban area more than doubled, from 1,379,000 to 3,027,090.⁴ Internal immigrants moved from the rural areas to the cities in order to find employment in construction and the industrial sector, but the Greek State was unable to cope with the huge demand for housing. The appropriation of the new concrete technology by unskilled and inexperienced workers and the local production of building materials led to the creation of a flexible construction industry. The new industry was supported by the State through tax privileges and a loose control over the implementation of building regulations, and soon became one of the key pillars of the Greek economy. Post-war reconstruction followed a selective appropriation of ideas of the modern movement through a vernacular process. The collaboration of landowners with self-taught contractors in the construction of polykatoikias drove the bottom-up development of the Greek cities under the State's tolerance.⁵

The infinite repetition of polykatoikias produced a "form-less, border-less, and place-less urban landscape" that has covered the whole Attica basin.⁶ Every single piece of land that was possible to build on was built on. New urban blocks were built on the sloppy surfaces while street infrastructure has covered the natural water network of Attica. Only the tops of the hills, the coasts, the archaeological sites, and a few public spaces have escaped development. The rest of the landscape has been transformed into a dense, small-scale urban environment.

OPPOSITE TOP AND DOWN
Charalambos Louizidis
and Aikaterini Niki
Glinou, Typical
polykatoikias from
the "Athens Archive."



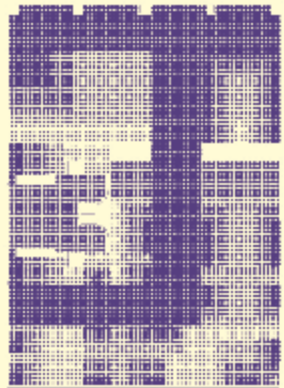
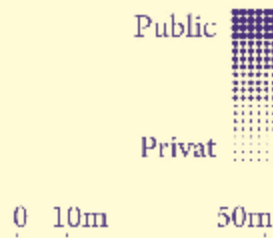
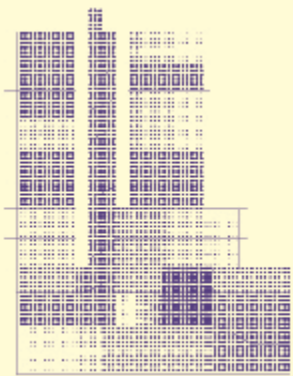


Architects had limited involvement in the production of polykatoikias during post-war reconstruction.⁷ Thus, the architecture of the typical polykatoikia has been very simple. The repetition of the typical plan produces the apartment building while the repetition of the linear balconies duly produces the façade. The structure of the typical polykatoikia has been an evolution of Le Corbusier's Dom-ino system, with a reinforced concrete frame of columns and slabs, plus an elevator shaft and staircase, that allows for flexible floor plans. During post-war reconstruction, the typology of polykatoikia was hardly affected by changes in family structure. In most cases, the apartments were designed for nuclear families with children. Studios for single people were usually offered at the lower floors and the backsides of the buildings.

The most decisive factor in the evolution of the Greek polykatoikia, though, was the changes in building regulations. Some of the most distinguishable characteristics of the typical polykatoikia, such as the linear balconies and the erkers, were specified by the appropriate regulations. In the same way, the skyline of the Greek city, which is typically stepped, has been reformed due to the frequent change of height limitation.

OPPOSITE
Charalambos Louizidis
and Aikaterini Niki
Glinou, Typical
polykatoikias from
the "Athens Archive."

The flexibility of the plan allowed for the accommodation of a variety of programs in the polykatoikia. Most small-scale businesses and services, such as lawyers' offices, notary's offices, and dental clinics were established among the residential apartments. Street life has been extended through the arcades and the shops, which are usually located on the ground floors, and the rest of the public programs dispersed on the upper floors of the polykatoikias. At the same time, many domestic activities take place outdoors on the balconies, extending private life over the public street. In contrast to the new towns that were built in post-war Europe, the mix of uses that was achieved in the "semi-permeable" Athenian urban block has contributed to the creation of intimate, safe, and vibrant neighborhoods. The "osmosis of private and public spheres" that takes place in a modern urban context has been the strongest output of the informal urban development in Greece.⁹



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OPPOSITE
Analysis of the public
and private spaces
in a typical polykatoikia.
Source: Richard Woditsch,
"The vernacular of the
polykatoikia," in *Made
in Athens*, ed. Panos
Dragonas and Anna Skiada
(Athens: MEECC, 2012).

BELOW
Chrissoula Voulgari,
"Mr. George."

The Greek city introduced a new way of living through the endless repetition of polykatoikias. A new ubiquitous lifestyle was constructed that emphasized modernity, hygiene, and new amenities such as central heating, over the economic and ideological differences of the recent past. Home ownership became one of the most important elements of identity for the newly formed Greek middle-class. The development of Athens and the booming post-war economy obscured the class differences and contributed to the social integration of all those who suffered during the Civil War.⁹ A homogeneous city was produced for the rising population that has avoided "ghettoization" throughout the century. Under this perspective, reconstructing the city has been more than a response to the demand for housing. The bottom-up development of Athens has been a bio-political project that created a new city, a new social structure, and a new way of living.¹⁰



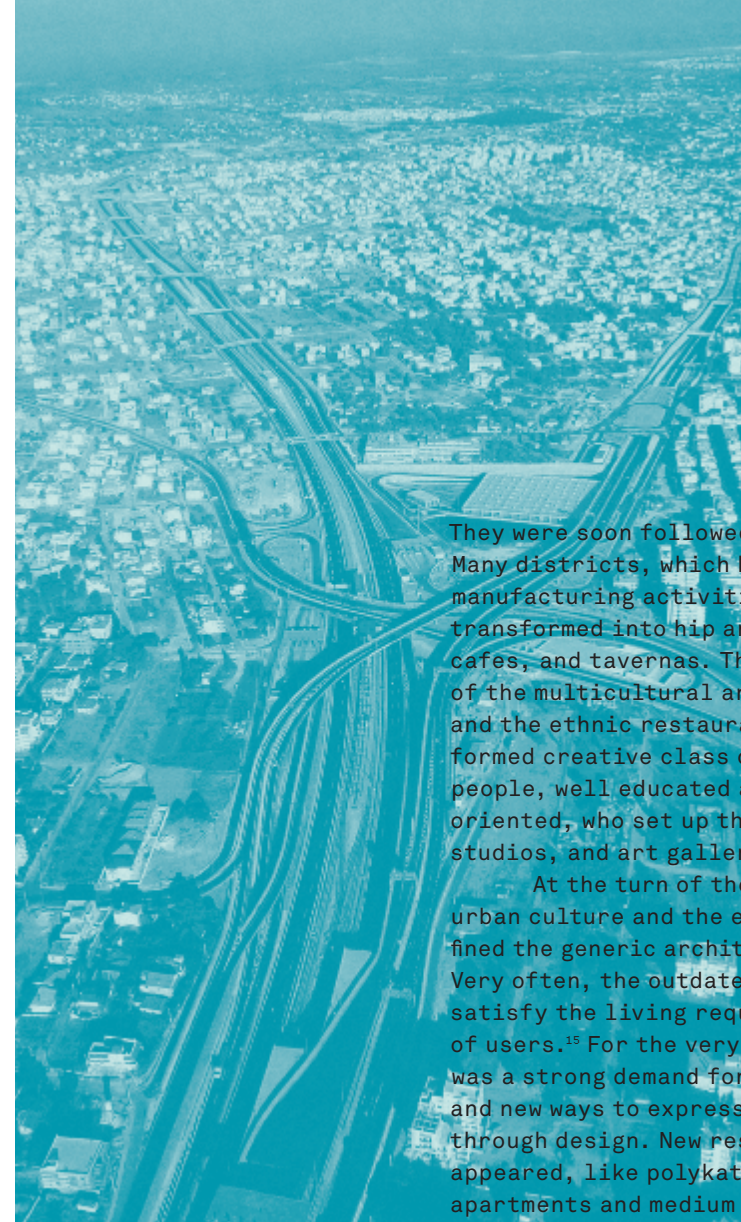
Globalization of the Vernacular City 1990-2008

Since 1989 and the collapse of the eastern bloc, Athens has been affected by the conditions of globalization. A big inflow of immigrants from Eastern Europe arrived in Greece in the early 1990s, soon followed by immigrants from Asia and Africa. Since 1981, the population of Athens has stabilized, reaching a peak of 3,534,608 in 2001.¹¹ The immigrant population is estimated to be around 12% of the total population in the urban area of Athens and 20% in the municipality of Athens.

At the turn of the century, economic growth along with cheap borrowing brought about a rise in living standards. Consumerism and wellbeing have constituted central elements in the identity of local society. The population of Athens has been socially polarized, divided by ethnic origin, religion, and income levels. Nevertheless, the city's residential areas have remained relatively mixed in terms of social class. Contrary to the dominant assumptions, a paradoxical coexistence of increasing social polarization with decreasing segregation has taken place in Athens.¹²

The organization of the 2004 Olympic games was an attempt to improve the position of Athens in the ranking of world cities. Olympic Athens was made up of major infrastructural projects, such as the new Athens International Airport, the Athens Metro, and the new Athens Ring Road.¹³ The new infrastructure allowed for the diffusion of the city into the rural periphery. New shopping malls and leisure areas were established along the new motorway, in competition with downtown commercial activities. Their proximity to the suburban residential areas offered a substitute of public place to the upper middle-class population, in accordance with the consumerist ideals and standards of the lending-based economy.

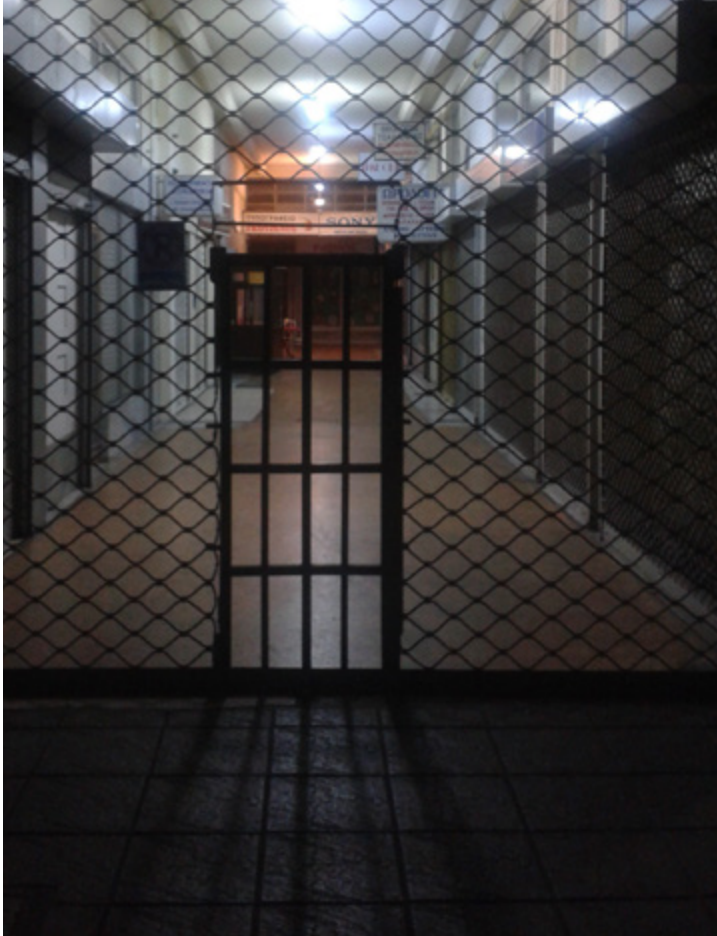
The diffusion of Athens created a major gap in the traditional center and generated opportunities for the new city contenders. The first groups of immigrants formed their communities in the abandoned central districts.



They were soon followed by the leisure industry. Many districts, which had been abandoned by manufacturing activities or services, were soon transformed into hip areas filled with nightclubs, cafes, and tavernas. The diversity and vibrancy of the multicultural areas, the colorful markets and the ethnic restaurants, attracted the newly formed creative class of the city: mostly young people, well educated and internationally oriented, who set up their living spaces, design studios, and art galleries there.¹⁴

At the turn of the century, the newly formed urban culture and the emerging lifestyles redefined the generic architecture of the polykatoikia. Very often, the outdated floor plans could not satisfy the living requirements of new types of users.¹⁵ For the very first time in Greece, there was a strong demand for new housing typologies and new ways to express cultural diversity through design. New residential typologies thus appeared, like polykatoikias with loft-like apartments and medium scale apartment complexes, while innovative reuse of the old buildings has become a challenge for architects. During the last years of economic prosperity, opportunities were offered in order to disrupt the monotony of the city through architectural design. Very often, the late examples of polykatoikias stand out of the homogenous city, creating moments of tension in the formless context. Under the conditions of globalization, the city of repetition has given way to a city of diversity.

ABOVE
Attiki Odos. Source:
Official Report of
the XXVIII Olympiad,
vol. 1, Athens 2004
Organizing Committee.



The City of Repetition in Decay 2009-2013

Winter 2008 was a moment of violent awakening for Athens. The global economic crisis unveiled the weaknesses of the Greek economy and the fictitiousness of the prosperity that was based on borrowing. Greek society, hypnotized by the hunt for good times, has been shaken to the core by the outbreak of the economic crisis and social unrest. Since 2010, the country has been under the rule of the European Union, the European Central Banking, and the International Monetary Fund. The collapse of the economy and a contestation of national sovereignty ushered the country into an era of depression. During the last four years, Athens has been in the spotlight of international media, while Greece has been ruled by international organizations. The Greek capital has thus become a “global city” in the most undesirable manner.



OPPOSITE
Elias Handelis,
Arcade in Athens.

ABOVE
Panos Dragonas and
Varvara Christopoulou,
Polykatoikia at
Pagkrati, 2002. Photo
Charalambos Louizidis.

UPPER RIGHT
Mariana Bisti,
Homeless in Athens.



The population of Athens has decreased for the first time, dropping to 3,089,698 in 2011. The limited demand for new housing has left thousands of newly constructed apartments empty. The construction industry has collapsed since the completion of the Olympic projects. The antipa-rochi system has practically died after the imposition of value added tax in real estate transactions. Real estate has become even more unprofitable due to the new regulations of energy efficiency on the old buildings. Moreover, the imposition of property taxes and the mortgage debt accumulation has put the private property in jeopardy.

The consequences of the financial crisis and the prolonged economic austerity measures are reflected in the urban space of Athens. The homeless population has increased. It is very common to see people collecting cans in shopping trolleys and well-dressed people begging for money. Poverty-stricken immigrants inhabit the former middle-class neighborhoods. Furthermore, the appearance of Golden Dawn, a far extreme right wing political party, has created conditions of horror in public space, carrying out acts of violence against immigrants, ethnic minorities, and political opponents.¹⁷

Economic recession along with the construction of large shopping malls at the periphery has ravaged small-scale commerce, deserting the ground floors of the polykatoikias. The porosity of the building blocks has been canceled, as life does not take place anymore through the Athenian arcades. Another way of living takes place just a few meters away at the thresholds of the polykatoikias, where the homeless people spend their nights quietly.

The collapse of the middle class has created tension among the residents of the polykatoikias. Many residents cannot afford the shared heating expenses, while jobless households cannot even afford the electricity expenses. Many indebted families live under the fear that they may be evicted from their households. Home ownership, the once dream-come-true for the middle class, has now become a source of fear. In the 2010s, polykatoikia has become the locus of the “indebted,” “mediatized,” “securitized,” and “represented” subject, that has been described by Michael Hardt and Antonio Negri in their book, *Declaration*.¹⁸ Isolated in guilt and misery, chained by communications and social media, living in constant fear, without access to effective political action, the impoverished Greek middle-class silently endures the depression era.

The conditions of globalization, the failure of Greece’s economic model, and the neo-liberal policies that Troika has imposed have put an end to the bio-political project of the 20th century Greek city. The conditions of development of the city of repetition have expired; the mechanisms of production have been canceled, and its social structure is under threat. Polykatoikia, as a generic building typology, is dead at the moment. However, its legacy is still offering a useful lesson for the development of future cities. The flexibility and porosity of the small-scale housing, the “osmosis” of the private and public domain in the urban block, the bottom-up urban development, and the high percentage of homeownership, has been a successful recipe for producing vivid and safe cities, resilient to social and racial segregation.

The crisis that is underway is more than a debt and fiscal crisis; it is a bio-political crisis. The world will overcome this crisis only when a subject capable of producing and sustaining a new democratic urban space emerges. Contemporary Athens is a laboratory where the subject of the 21st century city is being formed.

- 1 Viron Kotsamanis, “Athens 1848-1995. The demographic emergence of a metropolis,” *The Greek Review of Social Research* 92-93 (1997): 5.
- 2 Lila Leontidou, *The Mediterranean City in Transition: Social Change and Urban Development* (New York: Cambridge, 1990), 72.
- 3 Andreas Giacomacatos, “From conservatism to populism, pausing at modernism,” in *Greece: 20th Century Architecture*, ed. Savas Condaratos and Wilfried Wang (Munich: Prestel, 1999), 36.
- 4 Kotsamanis, “Athens 1848-1995.”
- 5 Dina Vaiou, “Milestones in the urban history of Athens,” *Treballs de la Societat Catalana de Geografia* 53-24 (2002): 219-220.
- 6 Yannis Aesopos, Yorgos Simeoforidis, “The contemporary Greek city,” in *The Contemporary (Greek) City*, ed. Yannis Aesopos and Yorgos Simeoforidis (Athens: Metropolis Press, 2001), 32-60.
- 7 Dimitris Philippidis, *Neohellenic Architecture* (Athens: Melissa, 1984), 310.
- 8 Richard Woditsch, “From thinking with to thinking of the polykatoikia: The need for a theoretical knowledge about the public and private spaces of the polykatoikia,” *Domes* (March 2008): 46-55.
- 9 Vaiou, “Milestones in the urban history of Athens.”
- 10 Pier Vittorio Aureli, Maria Shéhérazade Giudici, and Platon Issaia, “From Dom-ino to polykatoikia,” *Domes* 13 (December 2012): 70-79.
- 11 “Hellenic Statistical Authority (EL. STAT.),” www.statistics.gr.
- 12 Thomas Maloutas, “Segregation, social polarization and immigration in Athens during the 1990’s. Theoretical expectations and contextual difference,” *International Journal of Urban and Regional Research* 31.4 (December 2007): 736-750.
- 13 Yannis Aesopos, “Diffused Athens: Networks, consumerism and crisis,” in *Made in Athens*, ed. Panos Dragonas and Anna Skiada (Athens: MEECC, 2012), 44-59.
- 14 Panos Dragonas, “Crushed ground—The fragmented territory of austerity-stricken Athens,” *MONU Magazine on Urbanism* 19 (Autumn 2013): 88-93.
- 15 Panos Dragonas, “The suspended stride of the Athenian polykatoikia,” *Domes* (March 2008): 66-71.
- 16 “Hellenic Statistical Authority (EL. STAT.),” www.statistics.gr.
- 17 Dragonas, “Crushed ground.”
- 18 Michael Hardt and Antonio Negri, *Declaration* (New York: Argo Navis, 2012), 9-30.

OPPOSITE
Spatial strategies
to reclaim the urban
commons in Athens.
AREA Architecture
Research Athens,
“Athens Archive,” 2012.
Model installation at
the 13th International
Architecture Exhibition
-la Biennale di Venezia.
Photo Chrysokona
Mavrou.



Two Million Homes for Mexico

Text and photographs by
Livia Corona Benjamin

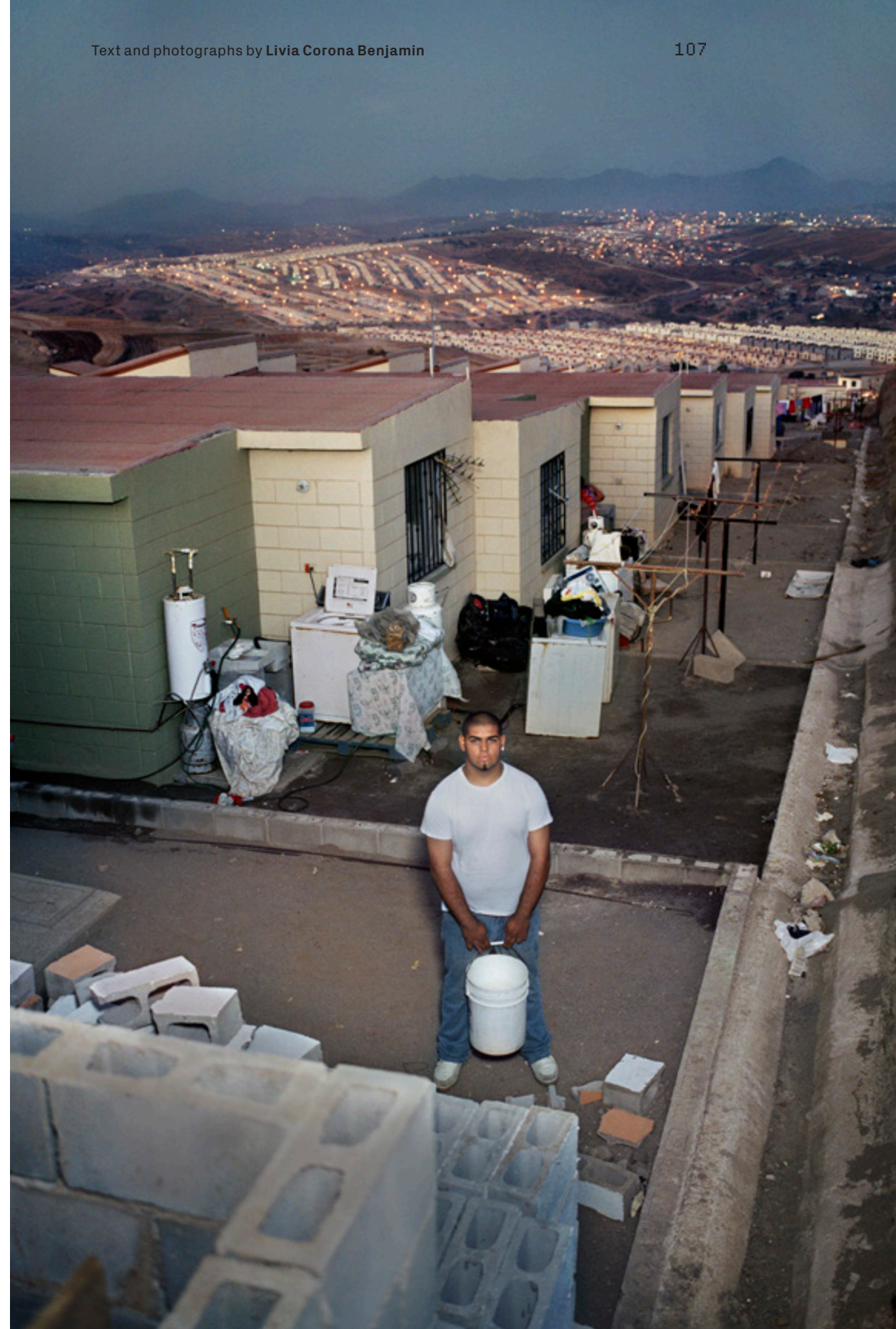


In 2000, Mexican presidential candidate Vicente Fox Quesada proposed an unprecedented plan to build two million low-income homes throughout the country during his six-year term. On the eve of his election, Fox proclaimed, “My presidency will be remembered as the era of public housing.” To enact this initiative, the federal government agency INFO-NAVIT ceded the construction of low-income housing to a small group of private real estate investors. Then, almost overnight, grids of 20 to 80,000 identical homes sprouted up, and they continue to spread in remote agrarian territories throughout the country. To encounter these developments by land, by air, or even via satellite imagery evokes a rare sensation. These are not the neighborhoods of a “Home Sweet Home” dream fulfilled, but are ubiquitous grids of ecological and social intervention on a scale and of consequences that are difficult to grasp. In these places, urbanization is reduced to the mere construction of housing. There are nearly no public amenities—such as schools, parks, and transportation systems. There are few commercial structures—such as banks and grocery stores. Yet demand for these low-income homes continues to increase and developers continue to provide them with extreme efficiency. During Fox’s six-year presidency, 2,350,000 homes were built, at a rate of 2,500 homes per day, and this trend is set to continue. During the past four years, I have been exploring these developments in Two Million Homes for Mexico. Through images, films, and interviews, I look for the space between promises and their fulfillment. In my photographs of multiple developments throughout the country, I consider the rapid redefinition of Mexican “small town” life and the sudden transformation of the Mexican ecological and social landscape. These urban developments mark a profound evolution in our way of inhabiting the world. In my work I seek to give form to their effect upon the experience of the individual. What exactly happens in these two million homes? How do they change over time? How are tens of thousands of lives played out against a confined, singular cultural backdrop?



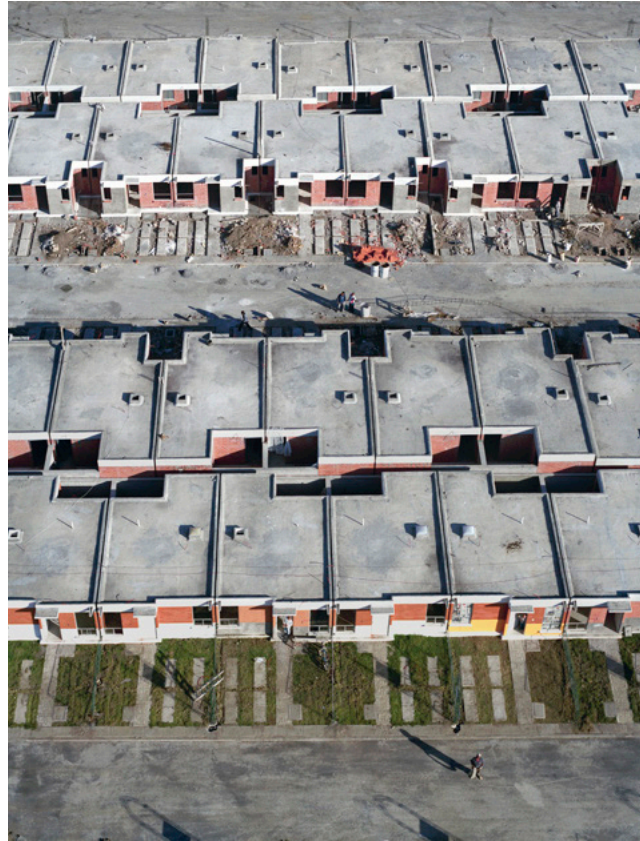








Two Million Homes for Mexico



BELLY FLOPS

Short Essay
by Michelle Benoit

Each Jelly Belly bean goes through a nine-step process that can take up to two weeks to complete. This, as our Jelly Belly Factory tour guide knowingly pointed out, produced a far superior product than the traditional three-day process used to make an “old-fashioned” jelly bean. This newer and longer process, introduced in 1976, allowed for the center of each jelly bean to be infused with flavor for the first time. Yum, infusion.

To begin, the filling for each Jelly Belly flavor was mixed in a kettle. The hot filling was dispensed into a tray of 1,260 jelly bean-shaped impressions, after which the tray was moved to a cooling room to allow the filling to harden. The cooled jelly beans were sent through a steam bath, covered with sugar, and then set aside to rest for 24-48 hours. After resting, they were placed in a rotating pan where four layers of syrup and more sugar were carefully poured over the jelly beans to form a solid shell. Next, coated with a confectioner’s glaze and polished to perfection, they were set aside for another 24-48 hours. For the finishing touch, each was stamped with the company’s logo before being packaged to be sold.

The factory tour did not spark an appreciation for a product perfected by a repetitive process—but just the opposite. I was drawn to the products of failure—the disfigured jelly beans, fused together, that were still just as delicious. The so-called “Belly Flops,” as these deviations from the ideal were deemed, were mechanically sorted out from the other jelly beans for not meeting the prescribed dimensions. They were sold in large bags that included an untold variety of flavors and mishaps waiting to be devoured. With my youthful reasoning—this was a fifth grade outing, after all—I paid no attention to the appearance of the jelly beans, but thought only of quantity. Given my extremely limited allowance I received to buy something from the gift shop, the marked down price of the Belly Flops made them even more attractive. From that moment on, my admiration for them was set.

Even though I have not eaten a Belly Flop since that day, there was something about them that stuck with me over the years. It was satisfying to find something that was celebrated for its differences instead of being discarded, and that was perhaps better because of them. The Belly Flops were one of the Jelly Belly factory’s best selling products, and were proudly sold alongside the “perfected” versions of jelly beans. The factory tour taught me that there is no such thing as a perfect process. There will always be deviations from the ideal. The difference was not to see the variations as failures, but as something to be embraced—just like I learned to embrace the Belly Flops.



ESSAY BY ——— PATRICK SYKES

WE PRINT BECAUSE WE CAN



DESIGN DEVELOPMENT OF THE GROTTA BY HANSMEYER / DILLENBURGER

REMOVAL OF SURPLUS SAND / PHOTO BY DEMETRIS SHAMMAS / ACHILLEAS XYDIS



1:3 SCALE PROTOTYPE - WHITE / PHOTO BY HANSMEYER / DILLENBURGER



The room that surrounds you is pure ornament. Spires, fan-vaulting, pillars, lattices, and basins: recognizable geometric forms that suggest themselves amid an otherwise amorphous, pure white texture of facing walls. These features support nothing, lead the eye towards no single point of focus, and have no function beyond the aesthetic, yet the intricacy of their details could occupy your attention for hours. The room, dubbed Digital Grotesque and completed last year, weighs 11 tons and measures 16 square meters, but only a fraction of that is navigable, admitting just enough space for you to enter, admire, and move on. According to its designers, it is “the first human-scale immersive space entirely constructed out of 3D-printed sandstone.”¹ Though innovative, both their project and the many parallel advances in 3D technology are grounded in, enacted through, and productive of repetitive processes that could not only change the face of the built environment, but may also demand a new paradigm for even the most everyday forms of engagement with it.

The hype surrounding 3D printing has propelled it into many areas of design and manufacturing—from toys to firearms—but its role in architecture is only beginning to be imagined. So far, the few projects that have reached public awareness have been characterized by a combination of fantasy and novelty, from Foster + Partners’ speculations about the feasibility of using the technology to build on the moon² to Universe Architecture’s plans for their Möbius strip-like Landscape House.³ Behrokh Khoshnevis, director of the Centre for Rapid Automated Fabrication Technologies at the University of Southern California, has more humanitarian inclinations,

and hopes that his “contour crafting” technique can build “dignified” structures for the displaced (he claims it can erect a 2,000 square foot, two-story house in only 24 hours and at a fifth of the cost of traditional construction). “If you look around,” Khoshnevis says, “everything else we use is made automatically, like the pen you’re holding, the shoes, the cars. The reason we don’t have [automated homebuilding] is simply that we haven’t had the large-scale technology.”⁴ With funding from Caterpillar, the largest construction equipment manufacturer in the world, he is confident that this is only a matter of time.

It is telling that the first 3D-printed room was built to do little more than inspire awe—in complexity, yes, but more specifically in the possibilities offered by a fledgling technology. Though initiated by Swiss architects Michael Hansmeyer and Benjamin Dillenburger, the design process for Digital Grotesque was enacted by algorithms, which generated the geometric forms from simple shapes. The creators revel in this concession of human control. “Printing a highly detailed grotto costs the same as printing a primitive cube,” they write, justifying complexity on grounds of possibility: we print because we can.⁵ The construction of a grotto, with its religious resonance, seems an appropriate milestone in the development of a technology—a space in which to revere a power we do not fully understand. The difference is that the space is not the setting for devotion, but the very object of it, the embodiment of God in the machine. They also point out with pride that it is printed to such a high resolution (one tenth of a millimeter) that its intricacies

ABOVE: 1:10 SCALE PROTOTYPE GOLD / PHOTO BY DEMETRIS SHAMMAS / ACHILLEAS XYDIS

“PRINTING A HIGHLY
DETAILED GROTTO
COSTS THE SAME
AS PRINTING A
PRIMITIVE CUBE”

GROTTO SIDE 1 - TEST ASSEMBLY / PHOTO BY HANSMEYER / DILLENBURGER



“exceed the threshold of human haptic or visual perception.”⁶ In other words, it is an invitation to appreciate what we cannot even experience.

Digital Grotesque is an extreme example, but at a time when interest in 3D printing and scanning is particularly high, it may set an influential precedent. Might the architects of the future be supervisors of autonomous digital processes? Neri Oxman, Assistant Professor of Media Arts and Sciences at the MIT Media Lab, suggested as much when she welcomed a new role for the designer as “an editor of constraints,” one who dictates the rules of the game and then allows it to play out.⁷ Whether this is an advance or a relegation is a question of

individual taste; what is clear is that additive manufacturing processes such as 3D printing offer a liberating paradigm shift insofar as they depart from traditional, inherently inefficient subtractive techniques such as drilling or cutting. When building layer by layer, Oxman’s “constraints” are in this sense remarkably unconstrained, in that there is no limit to the number or kind that kind be applied. Moreover, the products of architecture-by-algorithm can be repeated ad infinitum, either cost-effectively mass-produced or fed back into the mathematical function as a new raw material to be processed—an infinite loop of input and output, accumulation and disposal.

“IF YOU LOOK AROUND,” *KHOSHNEVIS* SAYS, “EVERYTHING ELSE WE USE IS MADE AUTOMATICALLY, LIKE THE PEN YOU’RE HOLDING, THE SHOES, THE CARS. THE REASON WE DON’T HAVE [AUTOMATED HOMEBUILDING] IS SIMPLY THAT WE HAVEN’T HAD THE LARGE-SCALE TECHNOLOGY.”



DESIGN DEVELOPMENT OF THE GROTTO / PHOTO BY HANSMEYER / DILLENBURGER

As costs are reduced and this latest, shiniest mode of production is further democratized, we will no doubt see benevolent low-cost projects (such as emergency shelters for displaced persons), but there will surely also be a proportional increase in architectural ambition (why not get more building for your money?). It is this latter megaproject impulse that is currently driving the technology forward, and likely to dominate it: though displaced persons have a fundamental need for shelter, they will often resist efforts by NGOs or governments to make their situation (closely tied as it is to a state of legal and humanitarian limbo) permanent; those at the other end of the spectrum will meanwhile be empowered to consume and dispose of buildings in a way that they have previously only done with Christmas presents.

If, as designer and critic Liam Young speculates, we are approaching a world of pervasive 3D printing in which “nothing is precious anymore and everything is a new object in waiting. Shape and form is just a temporary moment in the life of a material,” then what becomes of the “safe as houses” simile and all the associations of security and fixity that charge it with its figurative force?⁸ Cities have long been celebrated for their capacity to accommodate and instill social dynamism, but 3D printing could extend the scope of this organized chaos to the built environment, as an accelerated pace of building creates rhythms in urban time as much as fashions in space, and the planet’s famous skylines attract calls for preservation. Perhaps the nuclear families of 2050 will browse catalogues of the latest

architectural blueprints in the same supermarket in which they buy their vegetables, ordering 3D-printed updates to their homes. Or maybe the passive-aggressive neighborly pressure to maintain the front lawn will extend to the house itself, as architectural elements become as replaceable as items of clothing.

Walter Benjamin distinguished between works of art that have been reproduced and works designed for reproducibility. He claims that in the latter case, most notably in photography, “to ask for the original makes no sense.”⁹ The photographic negative can produce multiple identical images, none of which is any more or less definitive than the next, yet is not itself an accurate representation of the image. Architecture has of course always involved reproduction, from the imitation of individual structural elements to the introduction of pre-fab buildings and more recently full-scale copycat towns in China. But in accelerating our capacity to conduct these repetitions, the development of 3D technologies completes the circuit and obscures any notion of a site-specific, “authentic” experience of a landscape. Moreover, it also opens the way for imperfect reproductions. Data may be expansive and precise, but it corrupts, and the point at which it emerges as physical matter—in this case from the nozzle of the printer—relies on the tolerance and quality of a given device for its fidelity to the abstract blueprint. The algorithmic excess of Digital Grotesque may in its own way be beautiful, but the cracks are conspicuously visible.

1:3 SCALE PROTOTYPE - GOLD / PHOTO BY HANSMEYER / DILLENBURGER



1:3 SCALE PROTOTYPE - WHITE / PHOTO BY HANSMEYER / DILLENBURGER



PRINTED ELEMENT / PHOTO BY DEMETRIS SHAMMAS / ACHILLEAS XYDIS

“NOTHING IS PRECIOUS
ANYMORE AND
EVERYTHING IS A NEW
OBJECT IN WAITING.
SHAPE AND FORM IS
JUST A TEMPORARY
MOMENT IN THE LIFE
OF A MATERIAL”

Liam Young

GROTTO SIDE 1 - TEST ASSEMBLY / PHOTO BY HANSMEYER / DILLENBURGER

3D technology promises (or threatens) to bring its cycles of mechanical, urban, and psychological repetition to the very heart of the home, from its additive mechanics, in which nozzles and robotic arms trace and re-trace their steps layer by layer, to the power to scan and reproduce entire buildings (and perhaps eventually cities) in miniature or even at scale, and finally to an unprecedented extension of the logic of consumerism and disposability to the level of the previously solid, grounded urban landscape. Which of these forms of repetition dominates the others will depend on the kinds of projects that receive attention and investment—not necessarily in that order. What seems clear is that, as residents of cities whose site-specific characteristics are already blurred by the normalisation of multinational networks of communications and commerce, it will become harder still to form and retain a sense of what makes a place particular.



- 1 "Detailing," *Digital Grotesque*, accessed May 5, 2013, www.digital-grotesque.com/design_detailing.html?screenSize=1&color=1.
- 2 "Foster + Partners Works with European Space Agency to 3D print structures on the moon," *Foster + Partners*, January 31, 2013, www.fosterandpartners.com/news/foster-partners-works-with-european-space-agency-to-3d-print-structures-on-the-moon/.

- 3 "3D Printed Mobius Strip Home by Universe Architecture," *designboom*, January 24, 2013, www.designboom.com/architecture/3d-printed-mobius-strip-home-by-universe-architecture/.
- 4 "How 3D Printing Will Change Our World," *ArchDaily*, July 12, 2012, www.archdaily.com/253380/how-3d-printing-will-change-our-world/.

- 5 "Printing Architecture," *Digital Grotesque*, accessed July 14, 2013, www.digital-grotesque.com/concept2.html.
- 6 "One Process—Infinite Scales," *Digital Grotesque*, accessed April 14, 2013, www.digital-grotesque.com/design_composition3.html?screenSize=1&color=1.
- 7 "Neri Oxman: On Designing Form," YouTube video, 20:42, uploaded March 10, 2010, www.youtube.com/watch?v=txl4QR0GDnU.

- 8 Liam Young, "Control + P," *Icon* 118 (April 2013), 74-81.
- 9 Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," in *Illuminations* (New York: Schocken Books, 1969), 217.

Essay by Michelle Benoit

One Architect, Three Approaches:

Bertrand Goldberg's Early Experiments with Prefabrication, 1937-1952

John Snyder
Prefabricated Residence,
Shelter Island, New
York, 1952. © Bertrand
Goldberg Archive,
Ryerson and Burnham
Archives,
The Art Institute of
Chicago.

Bertrand Goldberg embraced an industrialized approach to building at a time when architects working in the United States were rarely involved in the construction process. Although he was certainly not the only architect to show an interest in prefabrication in the early twentieth century, it was an unusual pursuit since “design-build” was not yet a popular concept. The American Institute of Architects, according to Goldberg, highly discouraged architects from becoming involved in the construction of their designs for fear that it would lessen their attention to the design aesthetic in favor of profit making.¹ Thanks to his training both as an architect and engineer—Goldberg studied architecture at the Cambridge School of Landscape Architecture (Harvard) and at the Bauhaus with Mies van der Rohe in Germany, followed by further studies as an engineer at the Armour Institute (Illinois Institute of Technology)—he had a distinct advantage in understanding the ways to combine the design and structural aspects of prefabricated housing to create a streamlined final product without compromise. His interest in prefabrication was triggered by the changing needs of pre- and post-WWII society. Following the 1930s economic depression in the United States, architects could no longer rely on commissions to build private homes for the wealthy. Instead, they were forced to turn their attention to new kinds of projects: government-supported public works such as mass housing, hospitals, and schools.² Gone were the days of creating great works of architecture that did not contribute to a larger purpose. Post-war architecture needed to benefit society.

Upon starting his own office in Chicago in 1937, Goldberg decided that the best way to address the local economic crisis was to put people to work, not with their hands, but with machines. More specifically, through building prefabricated housing.³ Over the course of what he referred to as his “fifteen years of enthusiasm” for prefabrication, Goldberg developed two distinct approaches.⁴ The first was a method

of assembly that included the manufacturing of panels and other small pieces that could be quickly constructed on site, as demonstrated in his Standard Houses (1937-1943). With the increasing demand for mass housing during and after WWII, Goldberg developed a second method of fabrication based on the lessons learned from his Standard Houses. The Standard Prefab Bathroom (1946-1947), Unicel Prefab Freight Car (1949-1952), and Unishelter (1952) exemplify this second method. Here the entire building module would be completed in a factory and shipped to site ready to use. Over the course of fifteen years, Goldberg refined the design and even his philosophy of what a prefabricated house represented. His experiments with assembly and fabrication ultimately led to a third, and more innovative, approach to evident in his later work—building with geometric modules.

ASSEMBLY: Standard Houses

In the early part of the twentieth century, there were not many government agencies that paid attention to the nation’s housing problem.⁵ For that reason, Goldberg began experimenting with prefabricated housing through a study conducted at Purdue University (1937). His design was part of a neighborhood of demonstration homes built in Lafayette, Indiana. The five-room model had two bedrooms, a living room, kitchen, and bath. The exterior was built of “prefabricated plywood sections,” covered by a pitched roof. Goldberg used techniques such as standardizing windows and wall panels, reducing interior partitions (such as the elimination of corridors between rooms) and millwork to save in construction costs.⁶ Considering Goldberg’s training at the Bauhaus, his first attempt in designing a prefabricated home was far from modern. The traditional features, such as the pitched roof, were simply a matter of economy. Flat-roofed homes, as he pointed out, would have been much more expensive to construct and did not provide the extra storage space that was possible with pitched roofs.⁷



After completing a successful prototype, Goldberg was inspired to continue experimenting with prefabrication on a slightly larger scale. At the time, real estate and government experts estimated that there was an immediate need for several hundred thousand new homes in the Chicago area. Goldberg partnered with his associate Gilmer Black, along with a lawyer Edwin Ashcraft III and real-estate developer Ross J. Beatty Jr., who had a lot of property but no buyers. The group agreed that prefabrication was exactly what an industrial city like Chicago needed to fill the housing gap. Together the partners founded the Standard Houses Corporation, which was dedicated to producing low-income housing in the \$3,900 to \$6,000 range using the newest materials and practices.⁸ Their first project was a model community based off of Goldberg's prototype at Purdue University located on a small plot of land in Melrose Park, Illinois.

above 5 Houses Were Not
Enough! Standard Houses,
Melrose Park, IL, n.d.
© Bertrand Goldberg
Archive, Ryerson and
Burnham Archives, The Art
Institute of Chicago

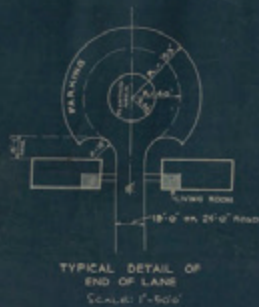
The Standard Houses at Melrose Park reflected the dream of creating an idyllic single-family home at an attainable price for working class families. Five one-story model homes were built, with slight variations to accommodate the needs of different families. There were five rooms (living room, kitchen, two-bedrooms, and a bathroom) that included amenities such as insulated hardwood floors, sliding doors, porcelain combination tubs and showers, heating, and hot water.⁹ Goldberg and Black placed a strong emphasis on the arrangement of the buildings on the site, staggering them at incremental distances away from the road to avoid the monotony of a "row-of-houses." The model homes opened on September 24, 1939. Advertisements for the homes touted that the designs were a result of two and a half years of research, including Goldberg's prototype for Purdue University, and represented some of the first low-cost housing in the Chicago area that was insured by the Federal Housing Association.¹⁰ The houses sold for \$2,995, a price so low at the time that it drew crowds, and all five homes were purchased by the end of the day. With payments of less than \$25 a month, the homes at Melrose Park were a true manifestation of affordable housing.¹¹

background image
The Standard Houses Corporation designed 57 houses (marked in orange on the plan) as part of a larger development, in which ten other companies participated. Standard Houses, Indian Head, MD, Plot Plan, 1941.

The Standard Houses Corporation's first venture was a smashing success, creating a demand for more prefabricated homes just like it. However, the team was not properly equipped with the resources to scale-up the project. Goldberg admitted that the houses at Melrose Park were realized in a way that "could only be done once."¹² Theoretically, the house could be reproduced with ease, but the team had not yet perfected the design to make the idea of prefabrication a reality. The shell of the first Standard House took a day and a quarter to be assembled, followed by another week of work by subcontractors to install the plumbing and electrical wiring. The project was fueled by the dedication and excitement of creating a new kind of housing, with considerable personal investment by Goldberg and his colleagues to pull the project off. Each of the four partners put in \$1,000 of their own money to build the houses. They convinced suppliers to loan them the materials, extending the credit to 60 days after the houses were completed. The factory space and machinery used to build the five houses had been rented.

The houses were priced so low that they brought in a profit of only \$100 each. The Standard Houses Corporation, at this point, was more interested in demonstrating an idea rather than starting a housing business. To repeat the project a second time would have required a more serious investment.¹³

Despite Goldberg's insistence that that the Standard Houses could not be replicated, he was able to continue experimenting with prefabrication when the Federal Works Agency sought out the Standard Houses Corporation to contribute to a housing development near the site of a defense industry in Indian Head, Maryland.¹⁴ The government offered the Standard Houses Corporation funding for fifty-seven houses at an average cost of \$3,000 each.



ALLOCATION OF HOUSES			CURVE DATA	
CONTRACTOR	UNITS	BLDG. NUMBERS	CURVE NO.	RADIUS
HOME BUILDING CORPORATION	50	1 - 30 INCL.	1	54-02-36 700.0
NATIONAL HOMES CORPORATION	63	31 - 68 "	2	3-55-42 2500.0
	(48+10)	375 - 390 "	3	3-56-42 2500.0
ALLIED HOUSING ASSOCIATES INC.	77	69 - 99 "	4	9-15-46 2500.0
	(46+30)	391 - 409 "	5	8-00-09 5500.0
HUMPHREY-HORSLEY CO. INC.	61	100 - 120 "	6	180-00-00 172.9
	(54+15)	348 - 369 "	7	16-19-45 500.0
HARWOOD-NEBEL CONST. CO. INC.	70	121 - 146 "	8	10-32-33 2500.0
		164 - 180 "	9	39-36-16 570.0
STANDARD HOUSES CORP.	57	147 - 163 "	10	10-18-46 2500.0
	(60+12)	197 - 210 "	11	13-29-10 700.0
		370 - 377 "		
PHC HOUSING CORPORATION	64	181 - 196 "	12	23-00-00 200.0
BERNEY & GAY FURNITURE CO.		211 - 232 "	13	10-29-10 800.0
E.F. HAUSERMAN COMPANY	20	233 - 239 "		
		274 - 282 "		
		307 - 310 "		
TENN. COAL IRON & R.R. CO.	58	240 - 273 "		
T. CALVIN OWENS	65	283 - 306 "		
	(34+15)	410 - 429 "		
LOCKWALL HOUSES INC.	65	311 - 347 "		
MISC. DETAILS			NOTES	
SEE PLAN SHEET FOR DETAILS			SEE PLAN SHEET FOR DETAILS	

opposite, from top
Standard Houses, Suitland,
MD, 1941. © Bertrand
Goldberg Archive, Ryerson
and Burnham Archives,
The Art Institute of Chicago.

Eero Saarinen's color
studies for the Standard
Houses added subtle
variation to the design.
Standard Houses, Suitland,
Maryland, n.d.

There were very few design guidelines provided by the government for the housing development. The project had to include a range of one- to three-bedroom homes, as well as the supporting utility systems. In addition, the Standard Houses Corporation had to prove that their proposed design could be dismantled, moved to a different site, and reconstructed within one day.¹⁵ Goldberg's dedication to fully understanding the amount of pieces used in the assembly and disassembly process was meticulous. He personally drew over 1,100 pieces that were involved in building each house. The Standard Houses Corporation rented a local factory where they produced houses at the rate of three a day, with the hope of increasing output to ten houses a day.¹⁶ Because of the significant delay caused by subcontractor work on the Melrose Park, Illinois houses, the Indian Head houses were manufactured with the plumbing, wiring, and insulation already installed at the factory, so they could be assembled quickly on site.

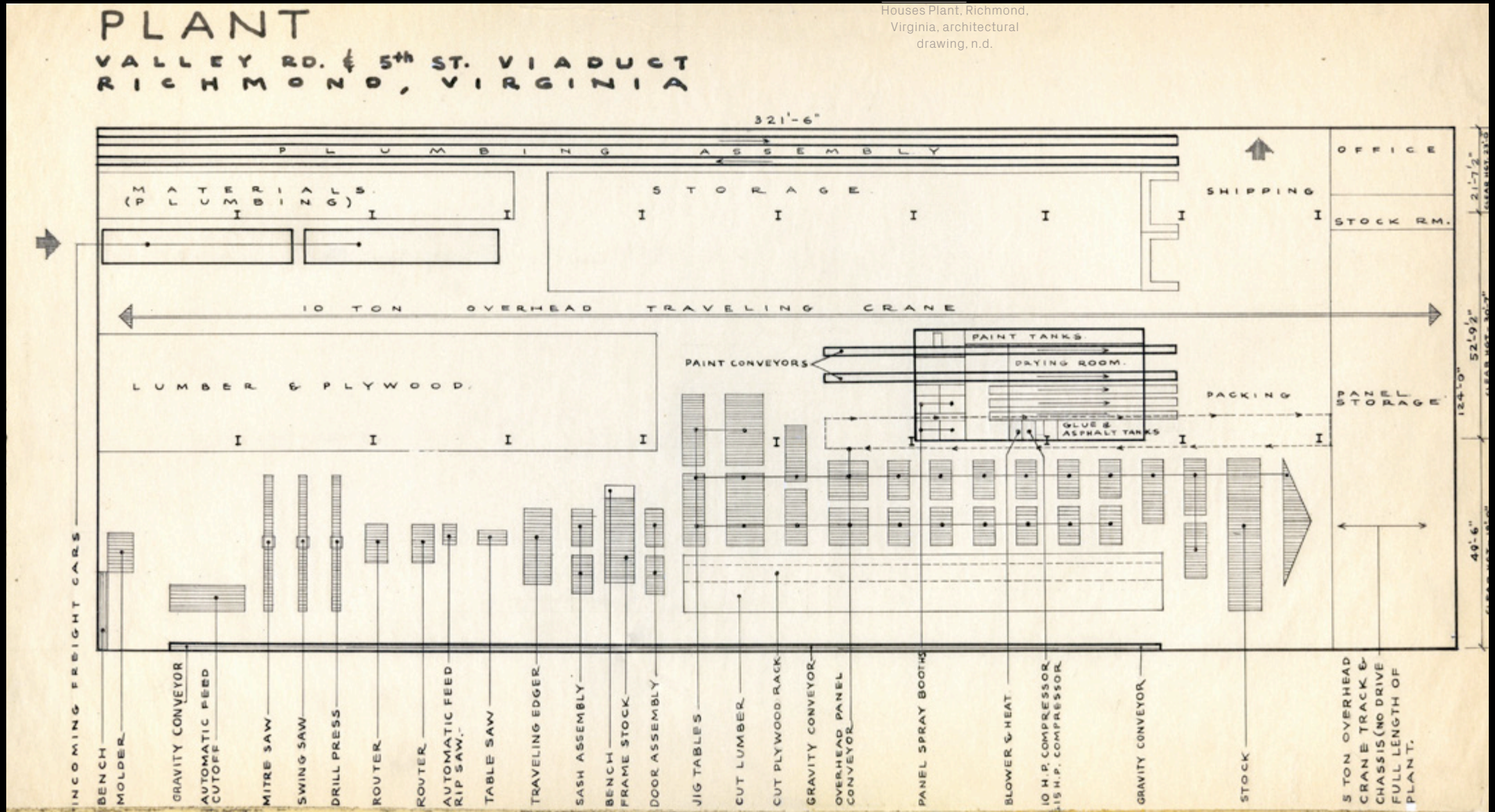
After the success of the development in Indian Head, the Standard Houses Corporation won another government contract to build a community in Suitland, Maryland. The Suitland development was larger and more elaborate than the company's previous projects, although the exact number of houses built remains unclear. Goldberg moved to Richmond, Virginia to design and oversee a new factory for the Suitland housing development. The layout of the factory was designed to encourage the workflow of prefabricated components, with separate departments for plumbing, electrical, painting, lumber milling, and assembly. The new factory greatly increased the output of the Standard Houses, and was able to manufacture the components (including wall panels, pre-assembled bathrooms, and kitchens) for ten houses a day. The finished pieces were then shipped to Maryland and assembled on site. Always looking to improve upon earlier models, Goldberg teamed up with Eero Saarinen to do color studies for the homes. The studies added a new dimension of variation in the homes, as the exteriors



were painted in different shades of brown, grey, and white, and had blue chimneys. However, the interior of the homes remained rather conventional.

With the establishment of a factory in Richmond dedicated to producing Goldberg's designs, his role in overseeing the Standard Houses began to seriously blur the line between manufacturer and architect. At times Goldberg mentioned that he felt more like a factory supervisor than an architect. It was a distinction that worried him, and caused him to wonder if his industrialized experiments could really be called architecture. In 1942, while Goldberg was meeting with the Virginia Pulp and Paper Company, a potential client, about a new project to support their Richmond factory, one of the paper factories exploded and fatally injured twenty people.¹⁷ Goldberg was one of only two people to survive the accident, and it took him over a year to recover. He continued the development in Suitland, Maryland while recovering, but the accident brought an end to the Standard Houses Corporation and signaled a new direction in his career.

The Standard Houses Plant
in Richmond, Virginia was
designed by Goldberg
to maximize the rate at
which the houses were
manufactured. Standard
Houses Plant, Richmond,
Virginia, architectural
drawing, n.d.



below top
Standard Houses
Assembly Line, Richmond,
VA, n.d.

below bottom
The bathrooms of the
Standard Houses were
pre-assembled at the
factory to reduce the
on site installation time.
Standard Houses Assembly
Line, Richmond, VA, n.d.



FABRICATION: Standard Prefab Bathroom, Unicel, and Unishelter

Shortly after recovering, Goldberg enlisted in the Office of Strategic Services as an opportunity to try something different: to break away from the more traditional design of the Standard Houses by designing new products in entirely new contexts.¹⁸ After several years of working with a prefabricated panel assembly system, Goldberg determined that he had the wrong approach because the process required too much field labor.¹⁹ He began working on an alternative approach to prefabrication, one in which the final product could be fabricated completely in the factory and then shipped to site. Even better, the unit could first be used as a shipping container, holding furniture, building supplies, or any other necessary materials. His initial tests with this method included a Mobile Delousing Unit (1942), a Mobile Penicillin Lab (1943), and a Convertible Gun Crate (1943). The Mobile Delousing Unit and Penicillin Lab became unnecessary because of advancements in medicine, and therefore the two designs were never built. However, about 250 to 500 of the Convertible Gun Crates were manufactured for the Army to deliver arms to site, after which the crate could be converted into a bunk or field office.²⁰

With the end of WWII in 1945, Goldberg's concerns began to shift toward urban architectural problems. He was convinced that "architecture for the individual was absolutely wrong, socially wrong, and that the only way in which architecture could develop would be through industrialization of components."²¹ He realized that there remained many urban houses that did not have indoor plumbing at the time.²² A single plumbing appliance could be a cost-effective and easily-installed addition to modernize an older home. Goldberg had already produced pre-assembled bathrooms for the Standard Houses made out of separate pieces of plumbing, but had never attempted to condense the amenities

below Gun Crate
(Convertible), architectural
drawing, 1943. Bertrand
Goldberg, designer.
© Bertrand Goldberg
Archive, Ryerson and
Burnham Archives, The
Art Institute of Chicago.

opposite With a flick
of the wrist, the washbasin
pivoted on a patented
swivel. It was a space-
saving feature that allowed
for it to be used over either
the toilet or tub. The design
included a convenience
cabinet in the side of the
washbasin that provided
a place to store cigarettes,
an ashtray, and magazines.
Standard Fabrication
Corporation, Prefabricated
Bathroom Units, n.d.

of an entire bathroom into a single, streamlined unit. He raised the equivalent of a half-million dollars at the time to start a new company and manufacturing plant in Chicago, the Standard Fabrication Corporation, and began working on a design for a prefabricated bathroom in 1946. The engineered unit saved space for homes where extra square footage was a precious commodity, and drove down the cost of purchasing and installing separate pieces of equipment. For the price of \$495, a family could have a bathtub, shower, washbasin, toilet, and storage.²³ Testing estimated that the unit would save at least two days of labor per installation, allowing for 70% more plumbing units to be installed in homes each week. The Standard Prefab Bathroom was designed for maximum living and minimum care, and as Goldberg proudly pointed out, had been called the “first new thing in bathroom plumbing since the Romans.”²⁴

Despite tackling some of a homeowner’s biggest concerns, Goldberg did not foresee the hurdles he would face in distributing the unit. There was the problem of getting approval for more than 1,500 different plumbing codes in the US and working with various unions. The bathroom units veered from the standard manufacturing practices and required different training to install, even though its four connections—a sewer connection through the floor, a vent through the ceiling, and hot and cold water hookups—were supposed to simplify the installation process. About 2,000 of the units were produced and sold to Montgomery Ward and other local distributors.²⁵ Desperate to sell the project,



Goldberg approached John Snyder, president of the Pressed Steel Car Company, to produce the Standard Prefab Bathroom on a larger scale. Snyder declined, but was impressed by Goldberg’s work. Instead, Snyder proposed that Goldberg design a new freight car built out of plywood as an alternative to steel, in response to the shortage of metal available after the war.²⁶ He thought that the freight car industry had fallen behind innovations of other manufacturing sectors and that it was time for an update.

The Unicel Prefab Freight Car was the newest freight car to be designed in half a century by the Pressed Steel Car Company, and was to be produced exclusively in Chicago.²⁷ The design was revolutionary because it was made of laminated super-strength plywood that could be bonded



below Pressed Steel
Car Company, Unicel
Prefabricated Freight Cars,
brochure, c.1949-1950.
© Bertrand Goldberg
Archive, Ryerson
and Burnham Archives,
The Art Institute of Chicago.



together to form a structural tube. The freight car's name, Unicel, was a reference to the single, cellular structure of the freight car. Plywood roof and side panels laminated to wood ribbing spaced on 16" centers formed the core of the freight car, which was finished with curved laminated corners.²⁸ Extensive testing went into proving the merits of Unicel. Two years of engineering research, completed with the help of the structural engineer Clarence Plisky, showed that the material was less expensive, lighter in weight, and performed better than steel. In 1950, the product was unveiled to over 800 of the nation's shipping and railroad executives in New York at the Waldorf Astoria, as well as at the Merchandise Mart in Chicago.²⁹ Unicel garnered significant interest and looked like it was going to be a successful venture. The final hurdle was to gain the approval of the Association of American Railroads (AAR) before Unicel could be used for general railroad service. In April 1951, the AAR technical committee tested the performance of the freight car in more than 32,000 miles of travel and found no structural failures.³⁰ However, following pressure from the AAR executive committee (in which a majority of the members were associated with the steel industry), the design was not endorsed.³¹

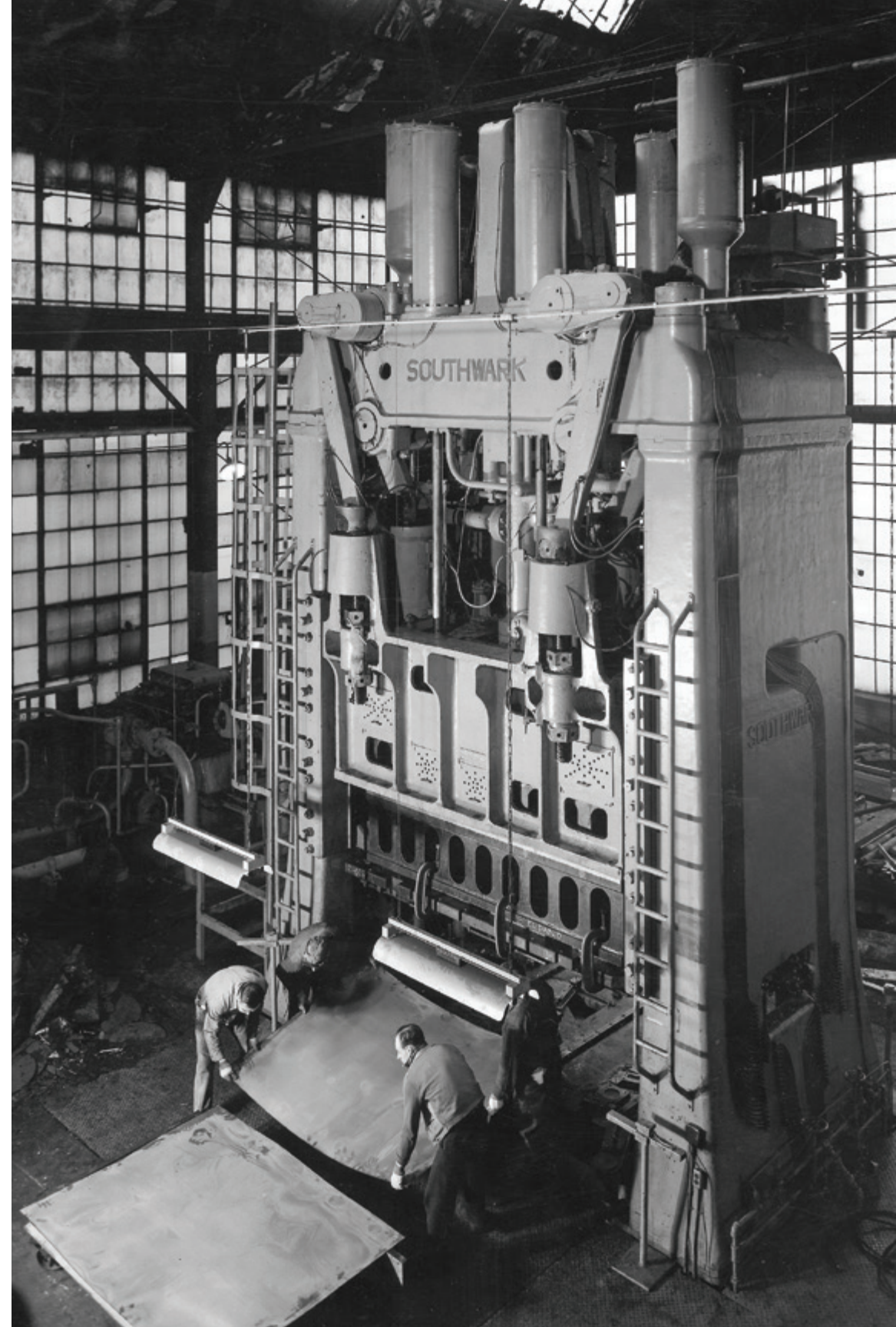
Somewhat disheartened by the failure of Unicel to break into the railroad industry, the Pressed Steel Car Company still saw potential in the product they had been developing. Goldberg, no doubt influenced by his earlier work, decided that the freight car could be repurposed as prefabricated housing.³²

opposite
Super-strength plywood
could be produced
in lengths of 40 to 60 feet
long with this machine.
Pressed Steel Car Company,
Unicel Prefabricated
Freight Cars, n.d.

The new product, Unishelter, was essentially the same design as Unicel, but with the addition of interior partition walls, windows, and doors. Because of the rigidity of the building module, Unishelter could be fabricated at the factory with all of the furniture included inside and then shipped to site ready to use. Goldberg thought of the building module as a large brick that could be arranged in different configurations to serve different purposes.³³ The basic Unishelter module included one bedroom, one bathroom, kitchen, and living area. A second module included two bedrooms that could be combined with the basic module to create a three-bedroom home, or even a five-bedroom home out of three modules. The Unishelter could be adapted for civic and commercial needs as well, with suggested configurations designed to best fit each use. Shopping centers could be arranged like an accordion, hospitals in the shape of an "H," and schools in the shape of an "E." In theory, an entire town of Unishelters could be erected overnight since the design required little on site work other than adding a minimal foundation and joining the modules in the desired configuration.

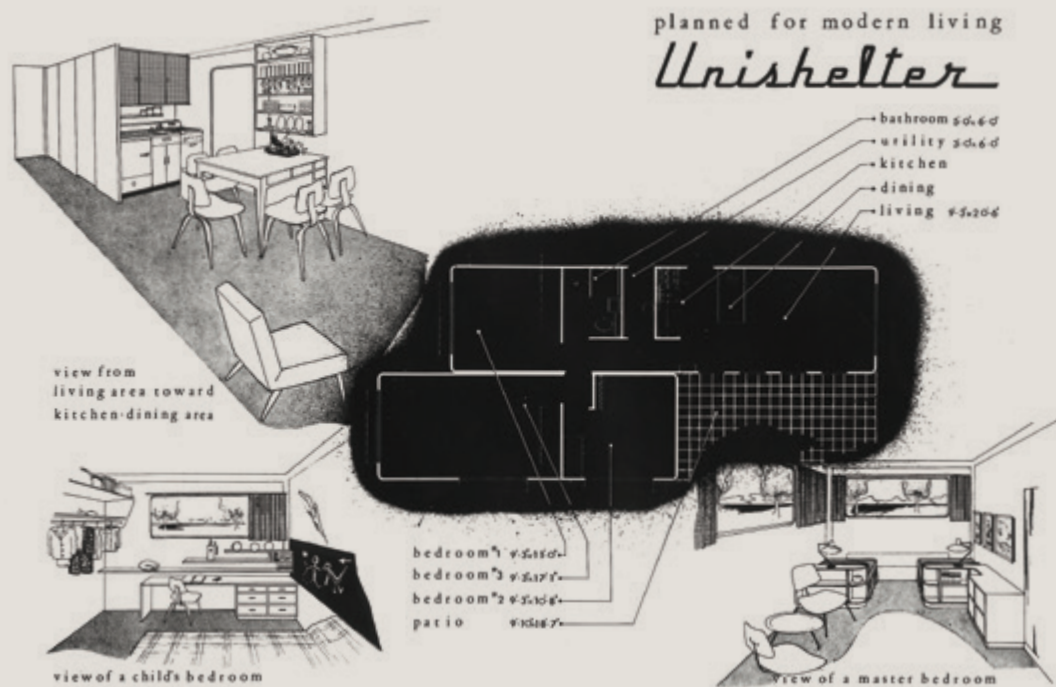
The Pressed Steel Car Company found the perfect outlet to test the newly-repurposed Unishelter design when, in 1952, the Relocatable Defense Housing (RDH) sponsored a study to determine the feasibility of using high-quality re-locatable housing as an alternative to temporary housing in defense areas. The designs had to be comparable in quality, livability, and cost to fixed site housing, and meet the standards prescribed by the Housing and Home Finance Agency (HHFA) research division, the Public Housing Administration, and the Federal Housing Administration. Only eight out of more than thirty-five submissions were chosen by the RDH task force to be built as prototypes. Unishelter was among the eight chosen.

The testing for the prototypes consisted of taking each house from its original foundation, loading and hauling the house through an urban area,

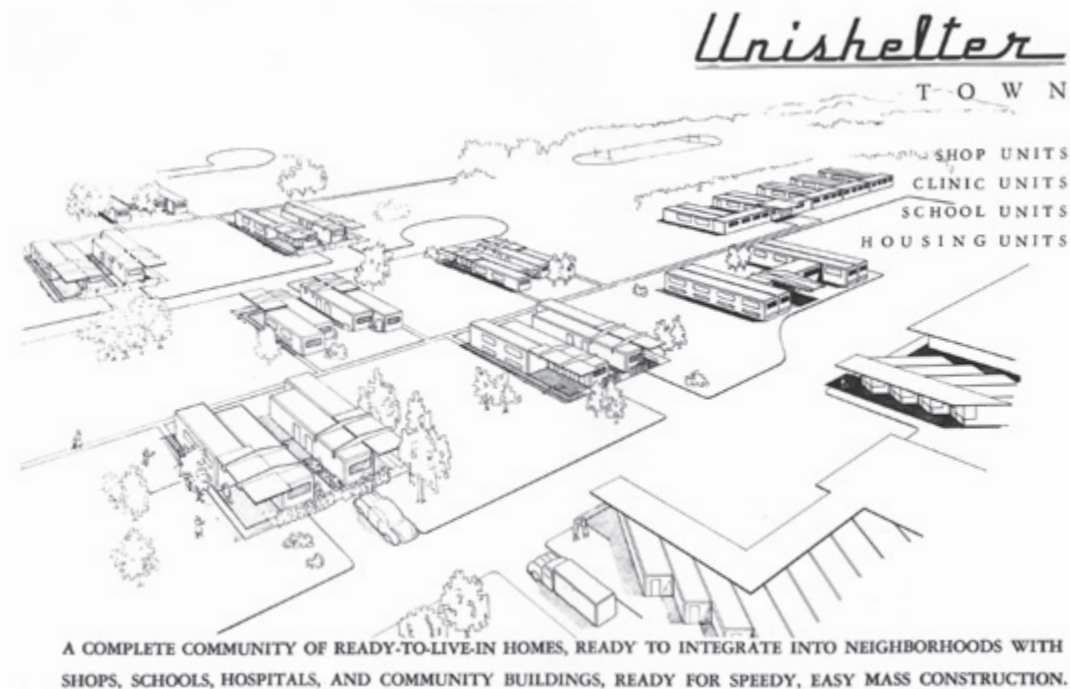


below The Unishelter modules could be combined together in a variety of configurations.

This configuration shows three bedrooms, a bathroom, kitchen, living, dining, and utility space. Pressed Steel Car Company, Unishelter Prefabricated Housing Units, architectural drawing, c.1953.
© Bertrand Goldberg Archive, Ryerson and Burnham Archives, The Art Institute of Chicago.



below The Unishelter was meant to be a versatile industrial building unit that could be used for housing, commercial, and civic purposes. Pressed Steel Car Company, Unishelter Prefabricated Housing Units, architectural drawing, c.1953.
© Bertrand Goldberg Archive, Ryerson and Burnham Archives, The Art Institute of Chicago.





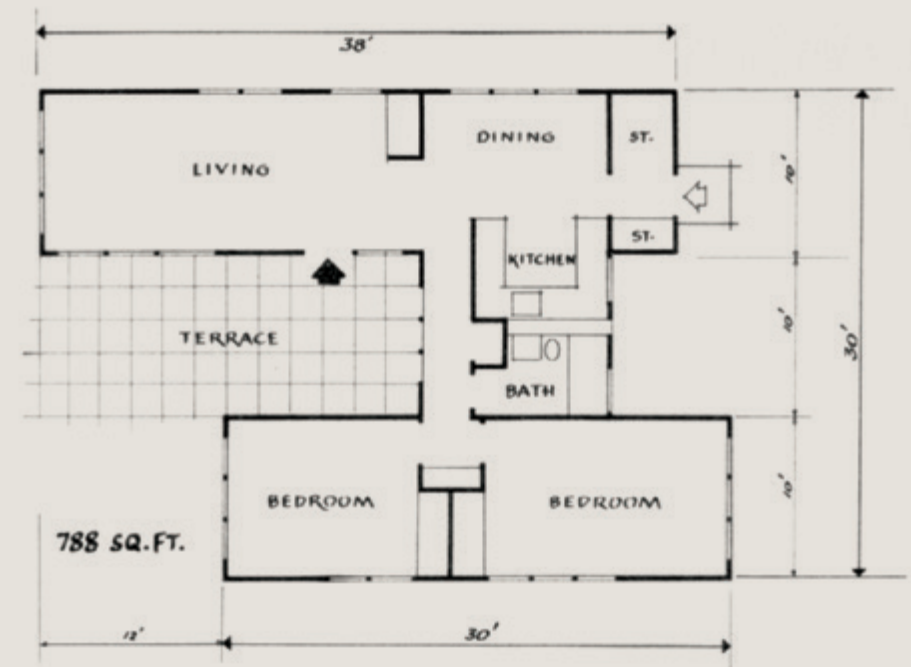
above
Unishelter prototype
built for the Relocatable
Defense Housing, 1952.

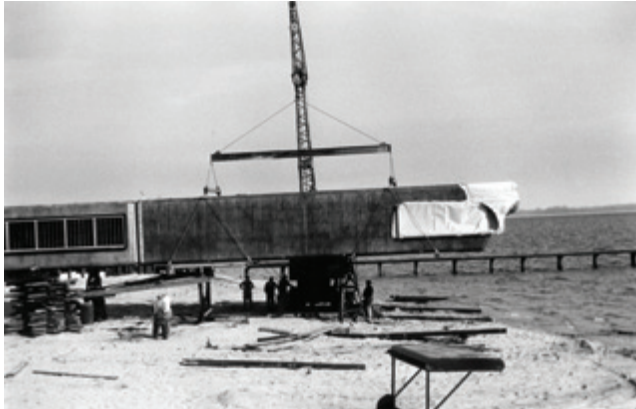
and installing the house in new location. Six of the designs were variations on the prefabricated panel system, including a folding (hinged) panel house and another that used a basic frame and curtain wall construction. Only one house could be shipped in its entirety, which awkwardly took up the width of the road and required a special driving permit to relocate the house. Thanks to Goldberg's years of experimenting, the Unishelter prototype was a unique and more refined design. The Unishelter could be moved 100 miles, from start to finish, in 122 hours. At the price of \$7,700 for three modules, which could be relocated for 8.1% of the original cost, Unishelter was predicted to make a "size-able splash" in the low-cost housing market.

The HHFA picked up the Unishelter for a larger-scale test community in 1953 and built 258 houses at Camp Stewart, a Georgia Army post.³⁴ The units were manufactured at the Pressed Steel Car Co. in Chicago, shipped to Georgia by rail, and assembled on site in groups of three to form a H-shaped unit. In addition to the Georgia Army post, the construction of 100 prefabricated homes was supposedly underway in Nevada, along with three other planned locations for Unishelter communities. A severe cut in the HHFA's budget for relocatable housing in mid-1953 brought an uncertain future for the Pressed Steel Car Company's success. Up until this point, the Unishelter had only been designed for the Army, and had not been tested for a wider market.

below
Unishelter prototype
built for the Relocatable
Defense Housing,
architectural drawing,
1952.

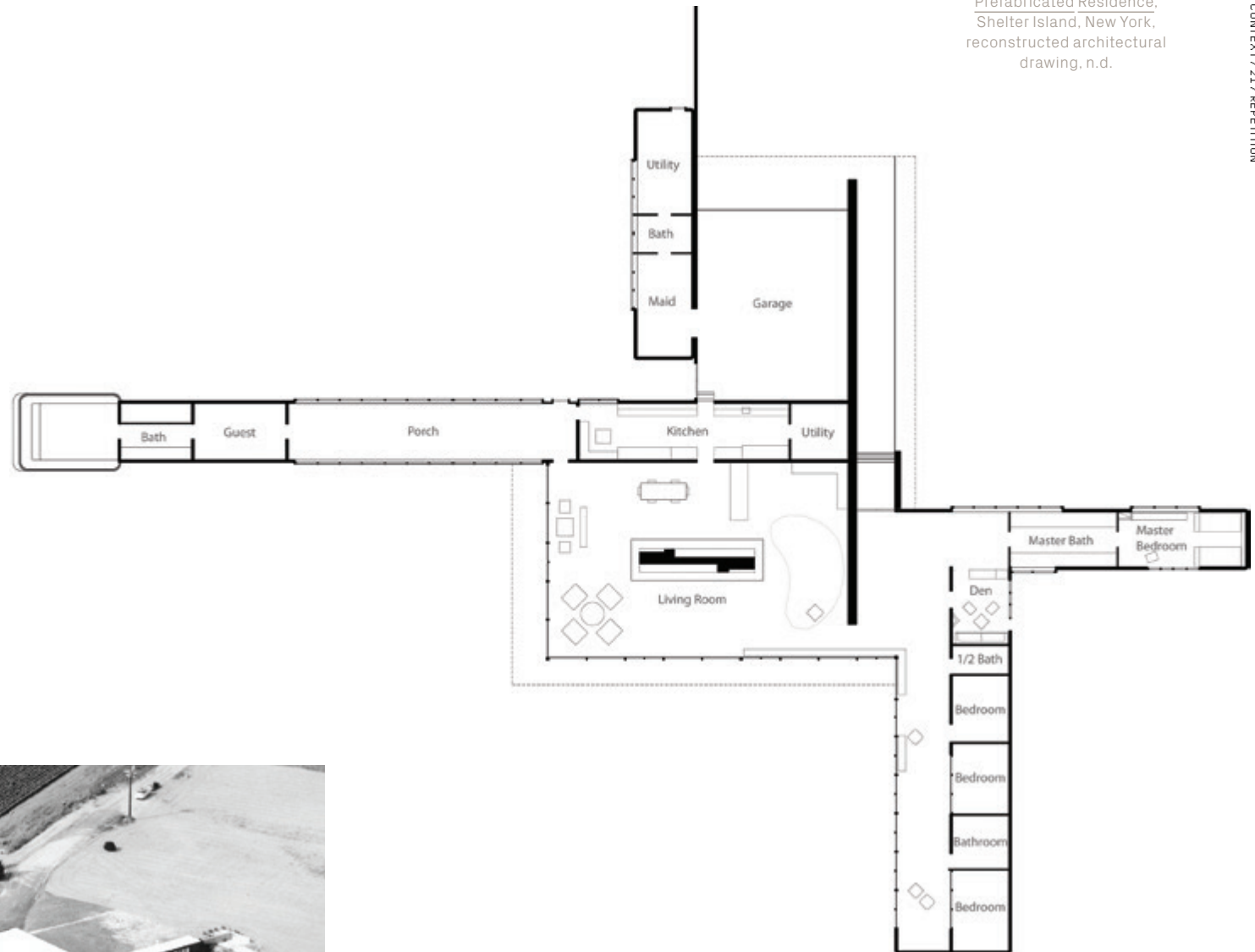
According to Goldberg, John Snyder decided to build an upscale version of a Unishelter home on his property in Shelter Island, New York to encourage a non-military application for the Unishelter. Completed in 1952, the Snyder Residence included seven Unishelter modules arranged around a central living space, also designed by Goldberg. One of the modules functioned as a kitchen, one as a utility room and maid's quarters, one as a recreation space, and the rest as bedrooms. The guest bedroom was the most dramatic feature of the home—cantilevered thirty feet over the ocean, to demonstrate the enormous strength of the prefabricated plywood construction.³⁵ The modules were completely furnished with all bathrooms, kitchen equipment, plumbing, heating, air conditioning, and furniture installed at the factory in Illinois. They were then shipped by rail, boat, and truck to demonstrate their maneuverability. The Snyder Residence used rich, heavier materials for the portion of the house built on site,





above The prefabricated Unishelter module was easily installed on site. John Snyder Prefabricated Residence, Shelter Island, New York, 1952. © Bertrand Goldberg Archive, Ryerson and Burnham Archives, The Art Institute of Chicago.

below Seven Unishelter modules were placed around the central living space. John Snyder Prefabricated Residence, Shelter Island, New York, aerial, 1952.



below John Snyder Prefabricated Residence, Shelter Island, New York, reconstructed architectural drawing, n.d.

such as an oversized stone fireplace and mahogany floors for the living room, and a lighter mahogany cladding on the Unishelter modules. The combination proved that standardized building modules could be transformed into a luxury home. Snyder predicted that “similar wheel-less rail-road coaches [would soon be] sticking their vestibules into the water at every seaside resort in America.”³⁶

For Goldberg, the Snyder Residence was a turning point that caused him to give up on designing single-family homes and focus exclusively on multi-family housing. Although he regarded the Snyder Residence as his greatest triumph in his career up to that point, he became disenchanted with the possibilities of what prefabricated single-family housing could achieve. Under Snyder’s direction, Goldberg saw a future where the Unishelter would be repeated in subdivisions and resorts across the United States. In the process of devoting his attention to perfecting the design of prefabricated housing, he had left behind social and community planning aspects that were equally important to him. With the realization that each year the US government was spending more than \$2,000 per family to develop suburban life and less than \$100 per family in cities, Goldberg turned his attention toward reinvigorating urban life by building larger scale housing developments.³⁷ For too long, he built what the government, bankers, and factories were willing to pay for, without considering how the projects aligned with his own vision. Perhaps because of Goldberg’s disinterest in continuing the project and lower than expected sales, John Snyder closed the Unicel/Unishelter freight car plant in 1954.³⁸ The Snyder Residence was the last single family home to be built by Goldberg.³⁹



above View of the central living space and stone fireplace. John Snyder Prefabricated Residence, Shelter Island, New York, 1952. © Bertrand Goldberg Archive, Ryerson and Burnham Archives, The Art Institute of Chicago.

GEOMETRIC MODULES: Goldberg’s Later Works

Goldberg’s approach to prefabrication, in many respects, was far ahead of the times, and fell to the wayside due to a lack of acceptance by the industry and the public in general. Yet, by the time public opinion caught up with the wave of prefabrication, Goldberg had moved on to pioneer other ideas in housing. He was able to distill the lessons learned from his prefabricated single-family houses and apply them to a new kind of social housing. With Drexel Home and Gardens (1954-1955), Marina City (1959-1967), and Raymond Hilliard Homes (1963-1966), Goldberg no longer thought in terms of individually fabricated modules that could be grouped together, but instead in terms of geometric modules. Goldberg’s geometric modules were different from individual modules because they shared a single adjacent wall. This removed the redundancy created when two individually prefabricated modules overlapped,

such as the double-wall created when two Unishelter modules were joined together. The geometric modules were more than a way to minimize redundancy in material; they offered new structural opportunities, as well. Much like the bent plywood tube that comprised the basic structure and enclosure for the Unice/Unishelter freight cars, Goldberg thought of each geometric module as an enormous brick that could be combined in an infinite number of ways. He pioneered the use of geometric modules with a single shared CMU wall in the Drexel Home and Gardens, then through the radial column grid of Marina City, and finally through the Hilliard Homes where each unit became a structural module.

The Drexel Home and Gardens apartment complexes, a low-cost public housing development in Chicago, were the most straightforward (and least innovative) interpretation of the module as an enormous brick. The housing blocks were made of rectangular units stacked on top of each other: four on the bottom, four on top. The plan for Marina City, arguably Goldberg's best-known work, was made up of 16 repetitions of the same module arranged in a circular form. Although the modules appear to serve a structural function, in reality the core of the building provided much of the support. It was the Raymond Hilliard Homes that demonstrated the greater variation and flexibility possible when the modules themselves provided structural support. Free from relying on the core, the "shell structure" of the Hilliard Homes allowed for more playful arrangements of modules grouped for high-density living. Goldberg explored different social benefits associated with each configuration. The circular towers of the Hilliard Homes were thoughtfully orientated for elderly living. The direct relationship of each unit to one another, with a shared common space in the center, forced residents to check in on their neighbors and encouraged community relationships. The slightly curved form of the housing

towers for low-income residents were more suited for the needs of a family because they provided more space. The shape of two towers had the added benefit of looking down onto a "Tot Lot," a place where children could have the freedom to play outside while still being within the range of supervision of their parents from the units above.

In a 1973 interview that reflected on Goldberg's earlier work, the interviewer, John Cook, suggested "the repetition of the same unit over and over again in a housing area offers little opportunity for variety." While Goldberg acknowledged that prefabricated housing could be monotonous, it was more of a self-critique of his earlier work than of modular building in general. He refuted Cook's position by pointing out "there were different possibilities of combining the units...industrialization in architecture means almost limitless possibilities."⁴⁰ And therein lies what was perhaps one of Goldberg's biggest strengths as an architect: his ability to look past the stigma associated with standardized housing and to explore the limitless possibilities inherent in prefabrication. His initial "fifteen years of enthusiasm" for prefabrication, and continued interest in repetition in his multi-family housing, resulted in a truly revolutionary approach to urban living.

- 1 Bertrand Goldberg, interviewed by Betty J. Blum, transcription of tape recording, 1992 (Chicago Architects Oral History Project, Department of Architecture, The Art Institute of Chicago), 141.
- 2 Goldberg was working on the manuscript entitled “Architectural Fables” in 1997, shortly before his death in the same year. The series of brief essays on his earlier works were conceived in the same spirit as Louis Sullivan’s *Kindergarten Chats*, an architect that Goldberg greatly admired. Bertrand Goldberg, “Architectural Fables,” manuscript, n.d. (Michael Anania Papers [Box 35, Folder 4], Special Collections Research Center, University of Chicago Library).
- 3 Bertrand Goldberg, “The Aim of Bertrand Goldberg Associates,” press release, 1952 (Bertrand Goldberg Archive [Series XI, Portfolio 47], Ryerson and Burnham Libraries, The Art Institute of Chicago), 5. Also Goldberg, “Architectural Fables.”
- 4 Goldberg, “Architectural Fables.”
- 5 Many of the agencies, such as the Federal Housing Association, were in the process of formation in the 1930s. “RE: Standard Houses Corporation,” letter, c. 1940s (Bertrand Goldberg Archive [Series XI, Box.FF 20.46], Ryerson and Burnham Libraries, The Art Institute of Chicago).
- 6 House in Lafayette, Indiana: Bertrand Goldberg, Architect for Standard Houses Corp., *The Architectural Forum* (April 1939): 287.
- 7 Goldberg, Chicago Architects Oral History Project, 108.
- 8 Standard Houses Corporation, letter, August 10, 1937 (Bertrand Goldberg Archive Digital Collection, Ryerson and Burnham Libraries, The Art Institute of Chicago).
- 9 “Standard Houses,” news release, September 20, 1939 (Bertrand Goldberg Archive [Series XI, Box.FF 20.46], Ryerson and Burnham Libraries, The Art Institute of Chicago).
- 10 “Standard Houses,” news release, September 20, 1939.
- 11 “5 Houses Were Not Enough!” Standard Houses, Melrose Park, IL, n.d. (Bertrand Goldberg Archive [Series XV, OP 4.8], Ryerson and Burnham Archives, The Art Institute of Chicago).
- 12 Goldberg, Chicago Architects Oral History Project, 102.
- 13 “Factory Houses for \$2,995,” *The Architectural Forum* (January 1940): 66-67.
- 14 “New Industry Gets 175,000 US Contract,” *Anderson Indiana News*, June 13, 1941.
- 15 Goldberg, Chicago Architects Oral History Project, 108.
- 16 “City Gets Fabricated House Unit,” *Richmond News Leader*, October 8, 1942.
- 17 Goldberg, Chicago Architects Oral History Project, 130.
- 18 Goldberg, Chicago Architects Oral History Project, 131.
- 19 John W. Cook and Heinrich Klotz, *Conversations with Architects* (New York: Praeger Publishers, Inc., 1973), 129.
- 20 Goldberg, Chicago Architects Oral History Project, 131.
- 21 Cook and Klotz, *Conversations with Architects*, 129.
- 22 Goldberg, Chicago Architects Oral History Project, 134.
- 23 “Firm Making Fixture Unit in Bathroom,” *Chicago Sunday Tribune*, May 2, 1948, A3.
- 24 “An Inventor Shows City New Bath,” news release, n.d. (Bertrand Goldberg Archive [Series XI, Portfolio 47], Ryerson and Burnham Libraries, The Art Institute of Chicago).
- 25 Montgomery Ward, “The Sensationally New Complete Bathroom...in One Unit,” advertisement, February 9, 1948 (Bertrand Goldberg Archive [Series XI, Portfolio 47], Ryerson and Burnham Libraries, The Art Institute of Chicago). Also Goldberg, Chicago Architects Oral History Project, 136.
- 26 Pressed Steel Car Company, “UNICEL story of a significant new material,” promotional booklet, n.d. (Goldberg Family Archive).
- 27 “Railroads: Revolution in Plywood,” *Time*, October 1950, 94.
- 28 C.J. Plisky, “UNICEL-Combination Refrigerator-Box Car,” *Railway Purchases and Stores*, October 1950, 68.
- 29 “800 Executives View ‘Unicel’ Freight Car,” *New York Times*, October 17, 1950.
- 30 Theodore Brand, “Unicel, Freight Car of Plywood, Waits Verdict: Railroad Association to Make Decision,” news release, n.d. (Bertrand Goldberg Archive [Series XI, Portfolio 48], Ryerson and Burnham Libraries, The Art Institute of Chicago).
- 31 Goldberg, Chicago Architects Oral History Project, 138.
- 32 “Annual Report of Pressed Steel Car Company, Inc and Subsidiaries,” 1950 (Bertrand Goldberg Archive [Series XI, Box.FF 17.21 (OS)], Ryerson and Burnham Archives, The Art Institute of Chicago).
- 33 Goldberg, Chicago Architects Oral History Project, 112.
- 34 “Relocatable Housing Gets Its Biggest Test as First Families Move Into Glued Stressed-Skin Houses at Georgia Army Post,” *House & Home*, June 1953.
- 35 “John Snyder Prefabricated House,” notes, 1952 (Bertrand Goldberg Archive [Series I, Box.FF 19.6], Ryerson and Burnham Libraries, The Art Institute of Chicago).
- 36 Charles Ventura, “Plush Railroad Cars Take to Sea at Fashionable Shelter Island,” *Society Today*, n.d. (Bertrand Goldberg Archive [Series XI, Portfolio 48], Ryerson and Burnham Libraries, The Art Institute of Chicago).
- 37 Goldberg, “Architectural Fables.”
- 38 “Pressed Steel Car Company Closes Its Freight Car Building Plant in Illinois,” *Wall Street Journal*, May 28, 1954, 4. Also Alison Fisher, “The Road to Community: The Houses and Housing of Bertrand Goldberg,” in *Bertrand Goldberg: Architecture of Invention*, ed. Zoë Ryan (Chicago: The Art Institute of Chicago, 2011), 96.
- 39 Goldberg himself refers to the Snyder Residence as his last house, but it should be noted that he completely redesigned the house for Ralph Helstein in 1955 (which was originally completed before the Snyder Residence)—technically making it the last single-family home designed by Goldberg.
- 40 Cook and Klotz, *Conversations with Architects*, 129.

Digital files courtesy of Geoff Goldberg.

Repetition
as the
Crystallization
of a Design
Method

Essay by
Clara Olóriz

On the Search for Spatial Patterns:

The machine can only be understood as a tool that continuously repeats a predetermined cycle of activity, becoming economical as the result of producing a large number of identical parts.... It is the source of all the consequences, by which the industrial process is determined.¹

Konrad Wachsmann, *The Turning Point of Building*, 1961

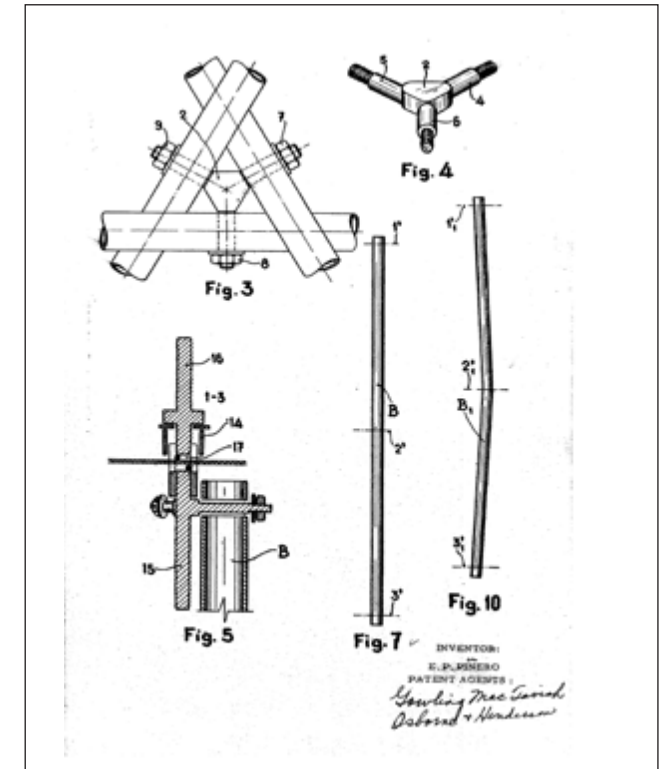
In the 1950s and 60s a group of Spanish architects embodied the “turning point” in the architectural profession—envisioned by Konrad Wachsmann—from their own local understanding. Among them were Rafael Leoz, Alejandro de la Sota, and Emilio Pérez Piñero. The clarity of their expression and uncompromised use of technology stemmed the creation of three remarkable production systems: the collapsible rod’s bundle by Emilio Perez Piñero from 1965, the Horpresa system by Julio Garrido in Alejandro de la Sota’s residence-school from 1967, and the HELE module by Rafael Leoz and Joaquín Hervás from 1960. While they are very different, they piece together an argument that responds to the condition of repetition

in the form of a grid. Each of them inhabits this spatial pattern under a particular scalar understanding that is contained in the notion of system: from the mechanics of the parts in Perez Piñero, to the ruled paper to which De la Sota entrusted the materialization of the ideas, to the possibilities of endless reproduction contained in Leoz's totality. Repetition is thus the condition that binds together all these scales in a very particular form that these three architects share, one that is found in nature. From these premises, repetition will be tackled here not as a result or consequence but as a condition or action; an operation under the guidance of a methodology carefully choreographed by the system that poses several questions: What is implied in the act of repetition? What is the understanding of space in the production of multiplicity? How is space produced and actualized?

Perez Piñero's collapsible structure patent is described as a "system of rods pivotally connected to each other by couplings which can be distributed by unfolding over a three-dimensional space and be folded until the rods and their coupling connections form a compact bundle which is easily manageable."² This structural system was used in the itinerant theatre proposal in 1961, in a dismountable pavilion for exhibitions in 1964 that travelled from Madrid, to Barcelona, and San Sebastian to commemorate 25 years of peace since the Spanish Civil War, in a lunar module, a collapsible structure for great-span domes and the unfoldable stained-glass window that he designed with Dalí.

The collapsible set of rigid rods that form a bundle was considered by Piñero as a "mechanism" which does not become a rigid structure until the ends are connected to the cables that complete the triangulation of the structure. The component was conceived as a structural member similar to a row of collapsible chairs assembled together. It is formed by a central coupling and is assembled to the adjacent components at each of the ends with other couplings, thus, each rod is anchored in one upper, lower, and intermediate coupling. The end couplings are tied by tension cables to restrict the opening and avoid the closing of the bundles once it is mounted. The upper layer of cables could be substituted for a fabric or a covering material to build a roof. In Perez Piñero's words, the

RIGHT:
Details from "Folding
three-dimensional
reticular structure"
Patent CA-707069.
June 4, 1965.

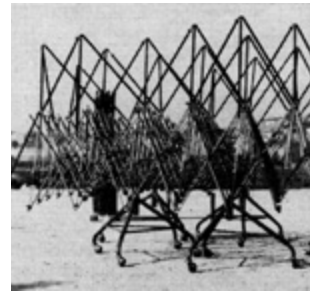
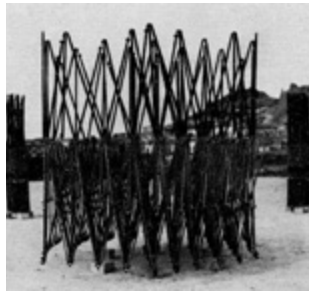
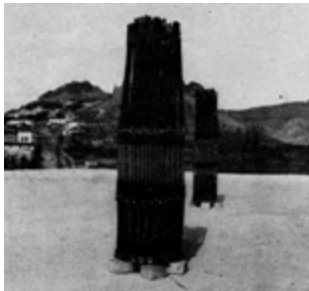


material structure parallels the behavior of a vertebrate body, the rods representing the skeleton in compression that channels the forces, and the tension cables being an analogy of the muscular system that surrounds and maintains the skeleton as a living structure.³ The component represented, in the rationalist sense of structure, the material skeleton that channeled the forces.

Perez Piñero's formal understanding resembles the part-to-part and part-to-whole relationships of the micro-form and macro-form found in crystals, inspired by the ideas of French architect and engineer Robert Le Ricolais. Along these lines, he compares architecture with music with regards to their essential structure and combinatorial laws based on mathematics, geometry, or mechanics.⁴ The aggregation of the bundles generates the macro-form that spans the space by the unfolding of

the components that are fixed by means of cables. The micro-form or inner structural definition of the component, that is to say, the variations in the number of rods and the location of the bundle's joint affects the organization and pattern of the system:

Equality or inequality of distances between each intermediate coupling and the two other extreme couplings of each rod. If the intermediate coupling is equidistant from the two other extreme ones (i.e. the upper and lower), the extended structure does not present any curvature.... If the intermediate coupling is not equidistant from the other two, then the extended structure adopts the form of a curve (a shell-shaped configuration); that is to say that the couplings of the same designation are found upon one of its three curved surfaces, concave towards the interior of the covered enclosure.⁵



ABOVE:
From the article
"Recent Three-
dimensional
Structures,"
Architectural Design
(January 1966).

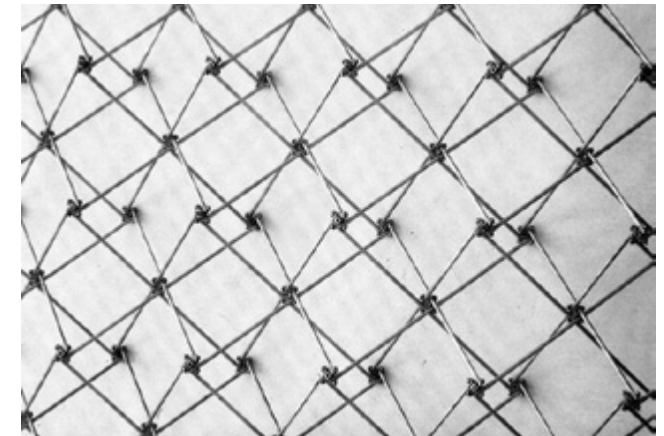
Photographs by
Emilio Perez Piñero.

Thus, the structural system conceived by Perez Piñero as a pattern of bundles of rods is both a mechanical structure but also a structural configuration.⁶ As a structural configuration, the way the structural parts or rod's bundles are assembled or the way elemental material is distributed and organized in space determines the properties of the structure.⁷ Form is dealt here at two different scales: "macro-form" or extended structure which responds to the anti-funicular of the loads and the "micro-form" as the internal structure that channels the efforts, the local form of distribution or the assembly of the parts. The way material is arranged in the space is

RIGHT:
Four rods component
assembly concurring in
a quadrangular pattern.
Fundación Perez
Piñero.

Photograph by
Ángel Fernández Saura.

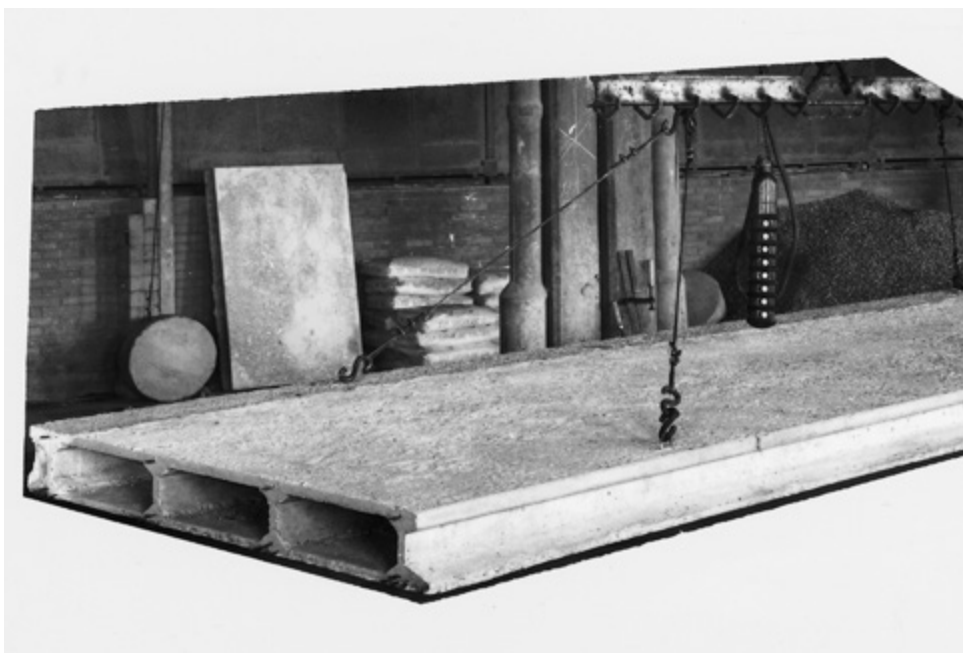
**The idea of crystalline meshes can also
be found in his definition of historical
archetypes as the crystalline conjunction
between matter, structure, and form.**



considered by Piñero as determinant of the micro-form, paralleling the microstructure of crystals or the ordered pattern of atoms and molecules. He considered form as "resistant form" and "material form"⁸ in which he highlighted respectively the identification of the conjunction form-structure as generator of resistance in the macro-form and the indissoluble dualism form-matter in the micro-form or intermolecular forces and of course, their interrelation.⁹

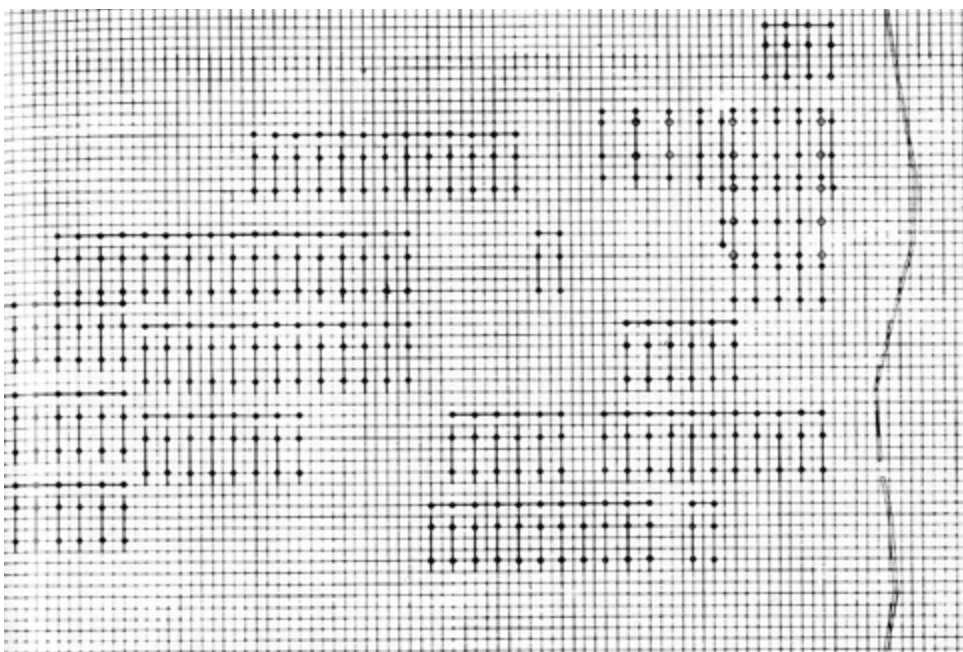
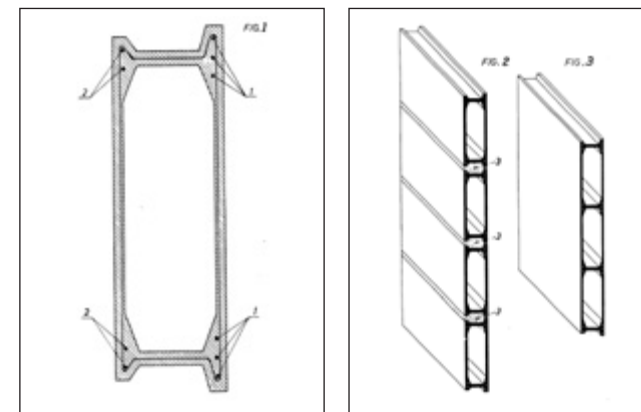
The idea of crystalline meshes can also be found in his definition of historical archetypes as the crystalline conjunction between matter, structure, and form. This conjunction provides the classificatory potential to structure as in the vegetal and animal classifications: the structural morphology. He compares this approach towards form with the mineral crystals whose distinctiveness resides in the system in which they crystallize, that is to say the process through which their internal structure is formed.

Crystallizing patterns are also implicit in the use of the Horpresa system and building method by Alejandro de la Sota in his unbuilt project for a school-residence in Orense from 1967. The patent of these panels was designed by Julio Garrido and consists of a multiple-position, hollowed, pre-stressed concrete panel that can serve as an element for the construction of walls, slabs, facades, and roofs. Its geometrical definition consists

**RIGHT:**

Geometrical definition of the module Horpresa. Illustrations extracted from the patent's details from *espacenet* and the European Patent Office Patent FR1329898A.

Panels composed by Horpresa modules with concrete joints or for walls following the concrete reinforcement.

**OPPOSITE TOP:**

Horpresa panel. Image sent by the Horpresa company to de la Sota from the Bahía Bella house prototype. Archive Fundación Alejandro de la Sota.

OPPOSITE BOTTOM:

Adaptation of the Horpresa system's rhythms to the topography in Orense. "Sentimiento arquitectónico de la prefabricación," *Arquitectura* 111 (February 1968).

of a box beam with ribbed ends in C-shape. The exterior plain faces are parallel to each other and the interior hollow has a rectangular shape with eight sides. Julio Garrido set the dimensions of the panels in a series of 16, 17, 18, and 20 cm for the width, and for the other two dimensions: one is fixed to 43 cm, and the other—the span—is open to variation. The set of dimensions of the elements offers variation to be adapted and assembled in various positions. Moreover, by pouring concrete in to the joints, a monolithic structure either for a slab or a wall can be obtained.

In an interview with architect Mariano Bayón, he recalled de la Sota being very worried because he had been working on this project for three years, the client was coming to visit him, and he had only one plan:

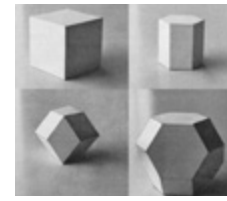
"It is graph paper! And of course here there is everything," exclaims Bayón. This graph paper contains everything—structural plans, prefabricated walls, even installations—and moreover it reflects the new modes of "projecting with the system." Thus, beyond the multiple positions in which the panel can be placed, the gridded paper is also the instrument with which the system lays down the guidelines or norms for the production of, or "to project," architecture. Since it is a prefabricated system, everything is ruled. It is unified under the systemic laws. According to Bayón, de la Sota used to tell them "there are some form of crystalline meshes that are not visible and architecture reveals them." He describes these

...logic, pure mathematics and within it, geometry and combinatorial topology.

meshes as a stereotomy—the geometry of cutting and assembling stones—inherent to space and the role of the architect is to unveil them; the role of architecture is to actualize them through the crystallographic twinings or macles. These crystals develop under certain organizing rhythms, graticules, or grids providing with complete solutions, everything is contained in the panel system. De la Sota's graph paper shows not only the way he operates with the repeated components but also his spatial conception and architecture's role within it. Similarly, Fuller defines this process of actualization as the organization of "the assemblage of visible structures out of subvisible modular structures," the macro and micro-form.¹⁰

Rafael Leoz's investigation focused on the search of "subvisible modular structures" to find homogenous and systemic divisions of space. One of the most interesting aspects of his methodology is the reversal of the order of the usual procedures in prefabricated methods, which start from construction details to arrive at a general solution. In these terms, repetition is tackled from the overall perspective of the spatial studies to give a response, subsequently, to the specific problem. Searching for more general laws towards the industrialization of building evades the lingering on anecdotic details from the very beginning. Most of the preceding experiments to cope with industrialization conditionings departed from a very sophisticated construction detail hoping to produce architecture from a technical detail, as a fundamental element. Alternatively, the priority here is in the essence of the architectonic space and its inherent structure and configuration.¹¹ Thus, he starts from the very organization and structuring of space: "the division and organization of architectonic space"¹² or "the harmonic systematization of space."¹³

This approach can be related to Reyner Banham's description of the Crystal Palace from 1851 that symbolizes repetition as precondition for the industrial revolution. The British critique foresaw in "the repetitive glass and iron units" a space which "seemed to contain infinity within itself,... running off endlessly as far as the eye could see," and what is more, space was "measured off by the regular module of the structure till it flickered away in an optical haze compounded on distance and light."¹⁴ It is



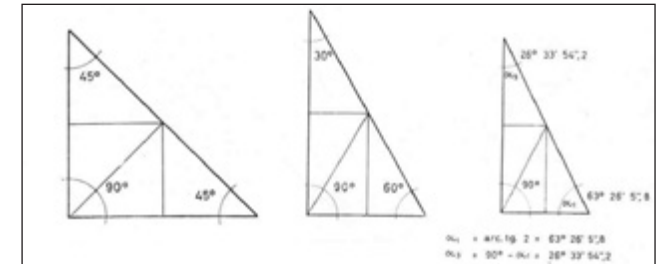
ABOVE:
The four radial symmetry polyhedrons capable of making solid space, according to Leoz. *Redes y Ritmos Espaciales*, 63.

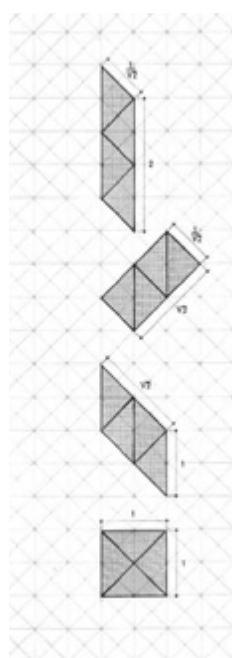
as if, rather than space being produced by the sum or repetition of units, space was produced through the subdivision of its infiniteness, through its infinite measurement.

Twenty-five years after the Crystal Palace was built, Viollet-le-Duc, inspired by the thirteenth-century French architecture, defines form "simply as the result of structural combinations; geometry bears away the palm from painting" and as "the result of reasoning and calculation."¹⁵ This statement defines industrialized architectural tools and production methods: "structural combinations" and "geometry," combining and measuring instruments which conditioned architects' modes of operation, in the application of mass-production techniques inherited from World War II. Even the notion of geometry and mathematics itself, influenced by scientific advances, would be deeply transformed. In 1953, the MIT's department of mathematics defined "mathematics" as what "most people think of as the science of number, is, in fact, the science of STRUCTURE and PATTERN in general."¹⁶

Geometry is thereafter the instrument that materializes the necessary linkage between industrial production and architects' design processes, constructing their common ground. Along these lines, Leoz describes the departure point of his studies and the architects' tool as: logic, pure mathematics and within it, geometry and combinatorial topology.¹⁷ Leoz intended to find a methodology or system to cope with the housing shortage with more efficient, accurate, and fast techniques. He envisioned the establishment of an open system with which architects could operate with the maximum flexibility and the most rigorous geometrical organization.

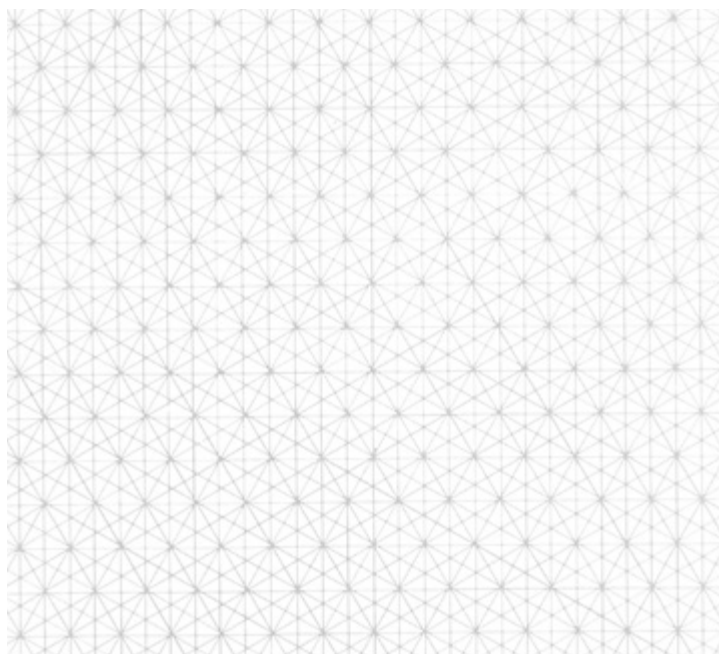
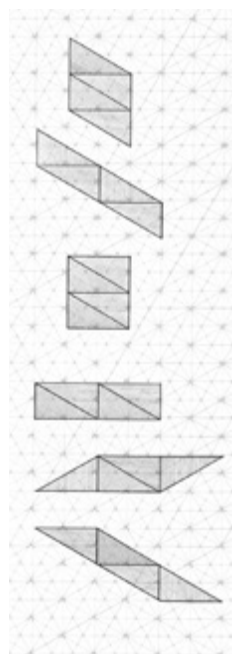
RIGHT:
The 45-45-90 triangle, the 30-60-90 triangle and the hemi-Pythagorean triangle. Leoz, *Redes y Ritmos Espaciales*, 105.





OPPOSITE TOP:
Four parallelograms formed within the 45-45-90 triangle system and its resulting 45°, 90°, 135° and 180° pattern. Leoz, *Redes y Ritmos Espaciales*, 106-108.

OPPOSITE BOTTOM:
Six parallelograms formed within the 30-60-90 triangle system and its resulting 30°, 60°, 90°, 120°, 150° and 180° pattern. Leoz, *Redes y Ritmos Espaciales*, 117-118.



The design methodology departs from the abstract organization of space, continuing with the determination of the dimensions, scale and modular coordination to arrive at the production of the components and their assembly, as the matter that is arranged in the systematization of space. His inquiries were initiated by the homogeneous division of the three-dimensional Cartesian space by means of infinite series of spheres; then, it evolved towards the study of the four polyhedrons of radial symmetry fit to be inscribed in a sphere and to solidify space—the cube or regular hexahedron, the regular hexagonal prism, rhomb-dodecahedron, truncated octahedron (tetra-decahedron), or Lord Kelvin's polyhedron—generating four spatial systematized networks, suitable to undergo affine transformations. Furthermore, Leoz intersected these assemblies of spheres and polyhedrons with planes passing through their centers that resulted in regular unlimited networks. These planar parallel sections, obtained from the spatial networks, originated planar grids that enabled the materialization of these simplified patterns by industry. These planar networks also corresponded to three planar right-angled triangles: the 45-45-90 triangle, the 30-60-90 triangle and the hemi-Pythagorean triangle—half of a Pythagorean triangle, an isosceles triangle in which the base is equal to the height.

Once space has been systematized through these patterns, more complex geometries can be achieved through their infinite affine transformations and their potential third dimension. Leoz devises four, six, or seven parallelograms or atoms for each organization respectively, formed by four equi-superficial triangles or quanta. The subsequent combination of these atoms generates a molecule that responds to the HELE rhythm or combinatorial law: an ordered L-movement within the spatial networks in their “chemically pure state.”¹⁸ These molecular compounds have the potential to be endlessly combined, thus, Leoz proposes to evolve from the general basic unit into a more complex topological multiplicity of operations in the generation of forms. He names this methodology as “geometric gene” or lawful combination of empty and full components, enabled by attributing a polyhedral structure to organize space in an isotropic and homogenous manner.¹⁹

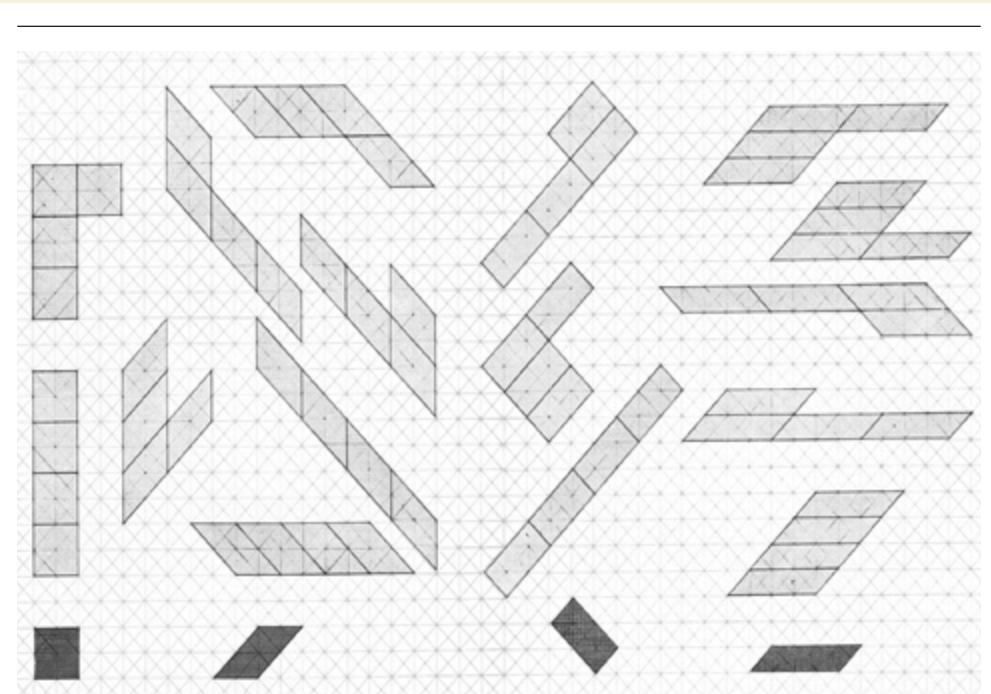
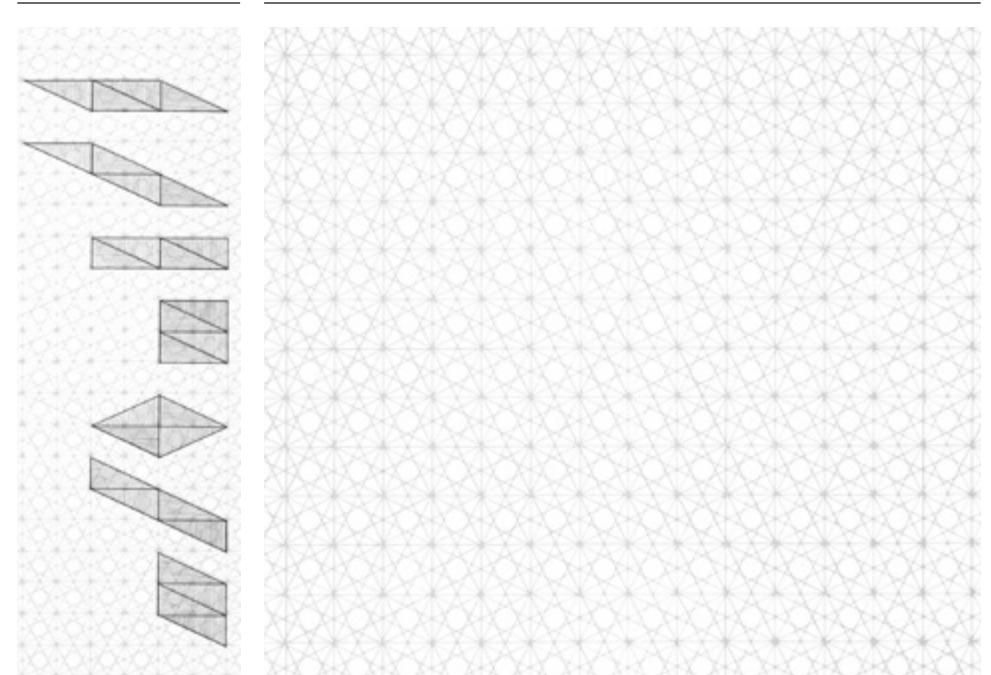
OPPOSITE TOP:
Seven parallelograms
formed within the
hemi-Pythagorean
triangle system and its
resulting pattern.
Leoz, *Redes y Ritmos
Espaciales*, 127-128.

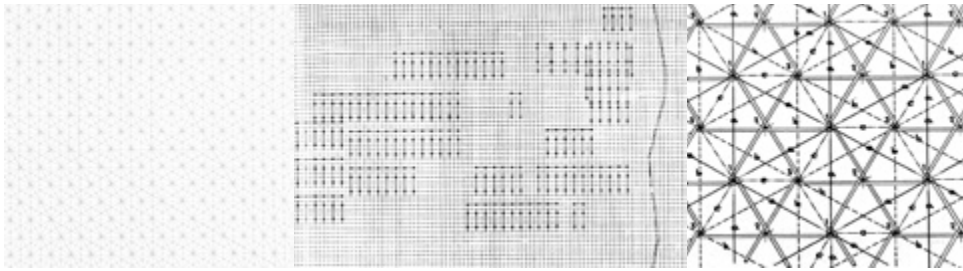
OPPOSITE BOTTOM:
Example of a set of
molecules within the
45-45-90 triangle
system, resulting into
equi-superficial rhythms.
Leoz, *Redes y Ritmos
Espaciales*, 110.

Le Corbusier referred to Leoz's work as an analogy with language, chemistry, genetics, and music, all of them sharing the lawful combination of a limited number of components into highly complex results.²⁰ Similarly, Leoz claimed that architects were confronted with very few components to prefabricate an infinity of results suitable to be combined between themselves. He compared the terrestrial material creation, result of the combination of a hundred different primary chemical elements, with his method of architectonic industrial prefabrication.²¹ The combination of HELE molecules—similar to crystals' molecules or atoms that are arranged in three-dimensional patterns—encompassed an ordering, homogeneous, and unifying understanding of space “measured off” by spatial frames. Structure is thus the only form that can be assigned to space; moreover, every idea about space is already a potential structure,²² thus, a reading or production of space as structural patterns; an understanding of the wholeness and “modular nature” of the world as Morrison puts it:

*The whole even of our world—radiant energy and protein matter, crystals and cells, stars and atoms—share the modular nature.... The prodigality of the world is only a prodigality of combination, a richness beyond human grasp contained in the interacting multiplicity of a few modules, but modules which nature has made in very hosts.*²³

These three projects tackle repetition by means of the natural analogy of crystal patterns, their intermolecular forces, processes of crystallization, modular nature, and wholeness. The crystalline paradigm is intrinsically related to the construction of space as a potential ordering structure that embodies the laws of generation and the parts as a totality. Space is produced through the lawful geometrical subdivision that rules the combination of molecular rhythms. As seen in de la Sota's graph paper, it contains everything and becomes an underlying unity or unified whole; a whole that is open because “a minimum of substance produces a maximum law;” homogenous because it is ruled and infinite since it can endlessly grow in the limitless subdivision of space.²⁴ As a condition of the production system and





ABOVE:
Gridded spaces
inhabited by Leoz's,
de la Sota's and Perez
Piñero's production
and design systems.

instrumentalized by the graph paper, these spatial patterns affect and regulate the way designers operate and “project” with it. Moreover, they affect the architectural production and its formation processes which are defined as the actualization of crystalline twinings or conjunctions of intermolecular forces.

The previous examples inhabit and give form to a gridded space, one that has the following characteristics: homogenous order, systematic parts, lawful combination, and overall structure. It is a grid that materialises through a specific act: crystallisation and one that fuses mechanics and structural arrangements. Throughout the three examples, the act of repetition becomes a method that embodies the component or part in Perez Piñero, the rules or guidelines in de la Sota's graph paper and the totality in Leoz's infinite subdivisions.

These approaches towards architectural production relate to their contemporary discourses about the understanding of “atomism versus form” and the morphological relationship between structure and form which were developed in concrete art and reflected in texts such as György Kepes' *Structure in Art and in Science* or Lancelot Law Whyte's *Aspects of Form*. Deeply influenced by the scientific discoveries about matter, form, and structure, they devised “a shift of emphasis from two contrasted ideas: from relatively isolated small units and over-all shapes, towards a single comprehensive and precise identification of structural patterns and their changes.”²⁵ These modes of architectural production and thinking have in common the crystalline analogy in which “the pieces have lost (or almost lost) their own meaning, and the structural or logical pattern is in complete command.”²⁶ Or, as Lohse poses it:

**The grid becomes the precondition,
instrument, and requirement sine qua non
for the establishment of a common method...**

An essential prerequisite for this advance was the recognition of the necessity of neutralizing the media; the element is defined as an anonymous form.... It is recognized in the course of the working process that the objectified element can only be operative in the community, as a member of a group, or in other words the anonymous, the objectified, the singular has the ability to operate only with other identical individuals. A minimum of substance thus produces a maximum of law, from which it follows that new picture structures can only be realized if it proves possible to convert the principle of addition of the identical into one mobile law governed regularity.²⁷

The resulting spatial understanding in their work is conditioned or rather produced by the logics of addition in the implementation of industrialized methods of production. Through the manufacture of large quantities of identical components, these systems transform the status of the architectural object, its production processes and, above all, the way architects operate. The fundamental requisite for these systems to succeed is the repeatability of their components, entailing a common modular coordination between design, production, and assembly and determining the geometrical definition of the parts. The establishment of geometrical laws or abstract system of dimensions allows the systematization of the media and the construction of a comprehensive methodology. The potential aggregation of the component is enabled by a new understanding of spatial patterns and rhythms that encompasses a new cosmology, or a new conception of the laws and structure of the “architectural” universe.

The production of space as potential ruling structures responds to the prerequisite mentioned by Lohse in the previous quote: “the recognition of the necessity of neutralizing the media.” The synthetic, common efforts, departure points, and homogenous work are proposed by de la Sota's prefabrication methods as a critique to architect's individuality or Whyte's isolated and overall shapes.²⁸ The grid becomes the precondition, instrument, and requirement sine qua non for the establishment of a common method, a common industrial language materialized in the graph paper. The structural pattern acts as a framework, as “the basis for the wholeness of the

How do we overcome the totalitarian aspirations of gridded methods?

appearance, of their formations and transformations”²⁹ or as “an aspect of the morphologic process”³⁰ within which architecture is actualized and architects operate with maximum flexibility and “minimum substance.” The gridded paper becomes the site to search for spatial patterns as the framework where the repetition of fundamental components will take place.

The system or methodology constructs a “governed regularity” in which the mesh reifies the set of instructions or laws, as the homogenizing base. The three examples here discussed were conditioned by the establishment of a common system for which the systematization of space is an inescapable prerequisite; it is the basis for the common understanding of the agencies involved. This grid is not new to the industrial methodologies; it has been only instrumentalized by them. In one way or another, it has been present in previous architectural manuals and academic attempts to systematize design by establishing common and scientific methodologies. This is a tradition within the discipline that continues developing in the efforts to institutionalize or validate certain styles, modes of work, theories and approaches in the form of unifying or all-encompassing “methodologies.”

Practices related to types, that use the part-to-part or part-to-whole relationships to understand the city or to produce it, looking for generic aspects that make possible comprehensive classifications; the infinite iterations or variations of digital and algorithmic design that are deployed within a spatial mesh or even biological analogies that simulate natural structures are usually related to contemporary forms of production and use these methods to validate design decisions. Supposedly, new technologies of production have overcome the repetition of Wachsmann’s “predetermined cycle of activity” however, structural meshes and lawful methods are still pertinent to the discipline as an operative instrument to establish comprehensive practices. This makes us interrogate the implicit reductionism of methods and wonder whether this critical condition is still truly inescapable; whether architects or designers can only operate and take decisions under the frame, guidance and validation of a method. If the answer is yes, then, the question becomes: how do we overcome the totalitarian aspirations of gridded methods?

- 1 Konrad Wachsmann, *The Turning Point of Building: Structure and Design* (New York: Reinhold Publishing Corporation, 1961), 49.
- 2 Emilio Perez Piñero, “Patent CA707069A: Folding three-dimensional reticular structure,” June 4, 1965, viewed March 2011, <http://www.espacenet.com/>
- 3 “Su forma de trabajo se asemeja al cuerpo de un vertebrado. Las barras a compresión forman un esqueleto, una auténtica columna vertebral. Las barras de rigidación actúan como el sistema muscular que envuelve y mantiene el esqueleto.... El cedimiento o movimiento de un apoyo produce, asimismo una readaptación de trabajo en la estructura. Es sencillamente una estructura viva.” Emilio Perez Piñero, “Estructuras Reticulares Tridimensionales,” *Arquitectura* 112 (April 1968): 4.
- 4 Emilio Perez Piñero, “Materia, Estructura, Forma,” *Hogar y Arquitectura* 40 (May-June 1962): 25.
- 5 Perez Piñero, Patent CA707069A.
- 6 As Adrian Forty remarks in his chapter about Structure in *Words and Buildings*, in architecture structure as mechanical support has never seen superseded by subsequent evolutions of the term because Structure in the rationalist sense or as the biological metaphor, permitted architects to claim a certain privilege and because of the physical nature of part of the architectural production. Adrian Forty, “Structure,” in *Words and Buildings: A Vocabulary of Modern Architecture* (London: Thames & Hudson, 2000), 283.
- 7 “No sólo han sido los materiales empleados lo que ha permitido ampliar estos espacios, sino que fundamentalmente ha sido el concepto mecánico, que ha manejado estos materiales determinando la forma de la estructura sustentante considerada como un todo (macroforma) y la forma local de distribución y ensamble de las porciones elementales de material que la constituyen (microforma).” Emilio Perez Piñero, “Notas sobre las estructuras,” *Arquitectura* 66 (June 1964): 22.
- 8 Churtichaga classified in “La Estructura Veloz. Trayectorias Estructurales a Propósito de la Obra De Emilio Perez Piñero y Felix Candela.”
- 9 “La determinación de la retícula interna, o ‘micro-forma’, debe estar inspirada, como ya hemos dicho, en las trayectorias de tensión que en la forma general, o ‘macro-forma’, produzca el sistema de cargas exteriores.” Perez Piñero, “Estructuras Reticulares Tridimensionales,” 2.
- 10 Buckminster Fuller, “Conceptuality of Fundamental Structures” in *Structure in Art and in Science*, ed. György Kepes (London: Studio Vista, 1965), 68.
- 11 “Insistimos en que lo primero es conocer la esencia del espacio arquitectónico y su íntima estructura y configuración a través de investigaciones puras, de análisis y síntesis de sus detalles y de su esencia.” “Parten de un detalle constructivo hecho con cierto material y generalmente bien realizado. A partir de ese detalle, y como elemento fundamental, se pretende hacer arquitectura.” Rafael Leoz, “Sistematización armónica del espacio arquitectónico hacia la industrialización,” *Arquitectura* 111 (February): 30. “Lo importante son las leyes generales, porque las soluciones concretas y singulares no son más que una anécdota dentro del sistema. Todas esas soluciones no son otra cosa que variaciones sobre el mismo tema.” Rafael Leoz, *Redes y Ritmos Espaciales* (Madrid: Blume, 1969), 143. An alternative argument to Leoz’s hierarchy can be found in Wachsmann: “The dissociation of large and very large volumes into small and very small individual parts, which may represent either positive objects or the single negative molds used in creating large, homogeneous structures, means that the starting point for structural conceptions must be the cell or unit element.” Wachsmann, *The Turning Point of Building*, 232.
- 12 Rafael Leoz, “División y organización del espacio arquitectónico,” *Arquitectura* 89 (April 1966): 27.
- 13 Rafael Leoz, “Sistematización armónica del espacio arquitectónico hacia la industrialización,” *Arquitectura* 111 (February 1968): 30.
- 14 Reyner Banham, *Guide to Modern Architecture* (London: Architectural Press, 1962), 50-51.
- 15 Eugène-Emmanuel Viollet-Le-Duc, *Discourses on Architecture* (London: George Allen & Unwin, 1959), 249.
- 16 Fuller, “Conceptuality of Fundamental Structures,” 68.
- 17 “Los estudios propios del arquitecto en sus más altos estratos son: la lógica, la matemática pura y, dentro de ella, la geometría y la topología combinatoria, la coordinación modular, los estudios sobre el ‘hábitat humano,’ las dimensiones óptimas de los nuevos materiales dentro de las nuevas técnicas, etc.” Leoz, *Redes y Ritmos Espaciales*, 46.

- 18 Rafael Leoz proposed this "chemically pure" state in order to arrive at the indispensable linkage between geometry and industry for the systematization of the architectonic design. *Arquitectura e Industrialización de la Construcción/ Architecture and Industrialised Building* (Madrid: Fundación Rafael Leoz para la Investigación y Promoción de la Arquitectura Social, 1981), 31.
- 19 "Esta genética geométrica parte del estudio sistematizado del espacio arquitectónico, adjudicándole a éste una estructura poliédrica de organización isotrópica y homogénea, donde los vacíos y los llenos participan de las mismas leyes, a partir de las cuales se generan las combinaciones necesarias y a las que se les puede dotar de toda la intencionalidad expresiva que el proyectista desee." Rafael Leoz, *Fundación Rafael Leoz* (Madrid: Fundación Rafael Leoz para la Investigación y Promoción de la Arquitectura Social, 1981).
- 20 Le Corbusier, *Arquitectura e Industrialización de la Construcción*, 44.
- 21 Leoz, *Redes y Ritmos Espaciales*, 44.
- 22 "La estructura es la única forma que se puede asignar al espacio; más aún, toda idea de espacio es ya en potencia una estructura," in Leoz, *Redes y Ritmos Espaciales*, 45.
- 23 Philip Morrison, "The Modularity of Knowing" in *Module, Proportion, Symmetry, Rhythm*, ed. György Kepes (New York: Studio George Braziller, 1966), 1.
- 24 Richard Paul Lohse, "Lines of Development 1943-1984" *Modular and Serial Orders* (Waser Verlag, 1984), 136.
- 25 Lancelot Law Whyte, "Atomism Structure and Form" in *Structure in Art and in Science*, ed. György Kepes (London: Studio Vista, 1965), 20.
- 26 Jacob Bronowski, "The Discovery of Form," *Structure in Art and in Science*, ed. György Kepes (London: Studio Vista, 1965), 59.
- 27 Richard Paul Lohse, "Modular Orders," in *Modular and Serial Orders* (Waser Verlag, 1984), 156.
- 28 Alejandro de la Sota, "Sentimiento Arquitectónico de la Prefabricación," *Arquitectura* 111 (February 1968): 12.
- 29 "In morphology, i.e., in the doctrine of forms, structure is treated generally as the basis for the wholeness of the appearance, of their formations and transformations; one can also say, as their prerequisite." Margaret Staber, "Concrete Painting as Structural Painting," in *Structure in Art and in Science*, ed. György Kepes (London: Studio Vista, 1965), 184.
- 30 Quoting from Whyte: "... not a rigid scaffolding for a schematized reality, but an aspect of the morphologic process." György Kepes, "Introduction," in *Structure in Art and in Science* (London: Studio Vista, 1965), iv.



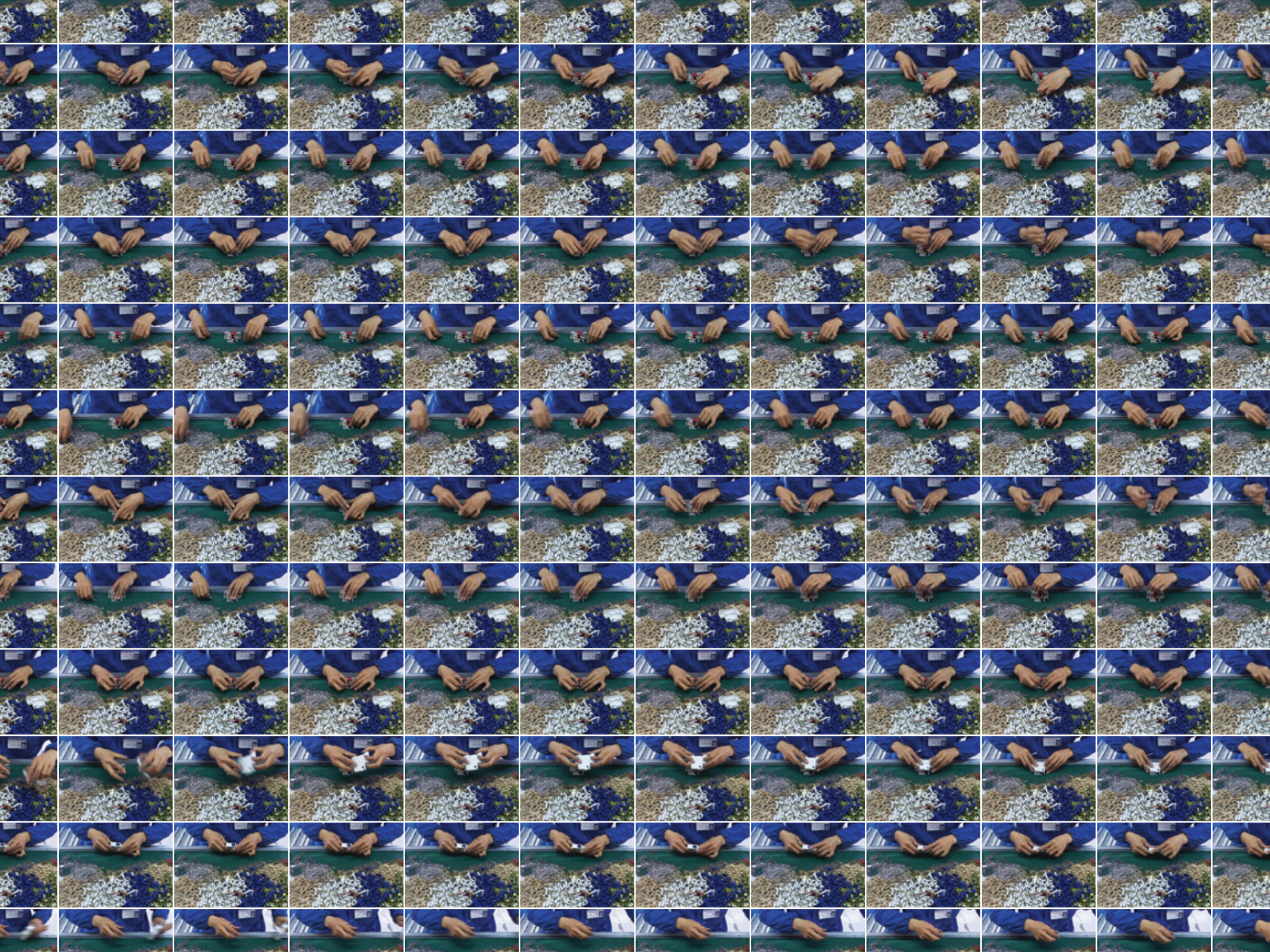
EDWARD

BURTYNSKY

BREAKER

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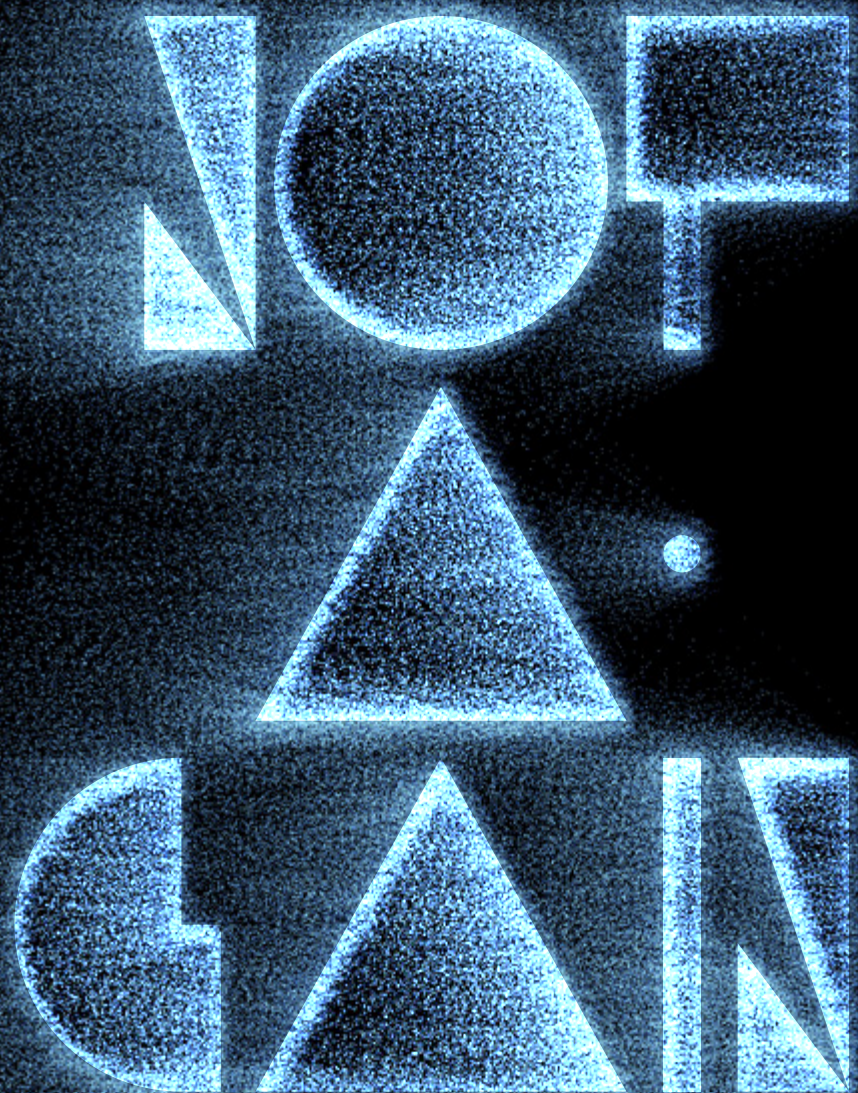
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Original Copies:
Inside China's Imitation Binge

Text and photographs
by Bianca Bosker

Adapted from
*Original Copies: Architectural
Mimicry in Contemporary China*



Here's a travel tip for you: if you drive about 30 kilometers west of downtown Shanghai, past low concrete factories coughing out smoke and high-rises looming over the city like yellowed storm troopers, you'll hit England.

It's not technically Her Majesty's terrain, but drop an Eton boy there and he'd never guess it's not his home turf. Meandering cobblestone streets are lined with squat, three- and four-story townhouses in a smattering of styles. There's a Tudor building here, a half-timbered one there, a brick façade just beyond, and, rising above them all, the spire of a Gothic cathedral that's a spitting image of the Christ Church in Bristol. Statues of illustrious British icons, including Winston Churchill and Harry Potter, keep a watchful eye over well-kempt lawns and tidy rows of trees, while security guards bustle about in the red uniforms of Buckingham Palace Foot Guards. Like in many European cities, there are tourists snapping pictures of the landmarks and historic buildings. A smattering of pubs, cafes, and snack shops standing at the ready to quench their thirst.



This is Thames Town, where you're invited to "taste [the] original British style of small town." Conceived, constructed, and sponsored to the tune of around half a billion dollars by the Shanghai government, Thames Town is one of hundreds of communities that make up China's massive movement in architectural mimicry, or "duplitecture." In the suburbs of China's megalopolises, larger cities, and even smaller towns in provinces throughout the country, developers are building enormous residential developments that replicate the towns and cities of the United States and Europe down to the most devilish details.

Chengdu, the capital of Sichuan Province, is home a residential complex for nearly two hundred thousand that is the twin of Dorchester, England, from its Poole Promenade to the cobblestone paving. In the Yangtze River Delta, a 108-meter replica of the Eiffel Tower graces Champs Elysées Square in what has been branded the "Oriental Paris," a faithful reconstruction of the City of Light that includes white Haussmannian apartments—shutters, wrought iron balconies and all. Not far away, Venice Water Town boasts doubles of Saint Mark's Square and the Doge's Palace edging up against manmade canals crisscrossed by gondoliers. Manhattan, Hallstatt, Amsterdam, Orange County, Beverly Hills, and the White House have all been doubled, often by Chinese architects who have studied the originals first-hand abroad.

In tracts recently occupied by collective farms, upwardly-mobile Chinese go through the familiar paces of life in unfamiliar settings. These duplitecture developments are, after all, no theme parks: what distinguishes the Chinese towns from Disneyland or Las Vegas is that the suspension of disbelief is temporary in the latter and permanent in the former. For theme park visitors, the escapist unreality the imagineered landscapes provide

ends as soon as they leave the park. For the Chinese residents of these themed enclaves, the fantasy is lived—daily, monthly, yearly.

Architects and architectural critics tend to turn up their noses at replicas of any sort, dismissing copies as the rip-off work of unimaginative and thieving plagiarists who are stymying the evolution of design. China's duplitecture is no exception: these copies have elicited derision and disgust on the part of Western and Chinese intellectuals alike, who have rejected these themed communities as "kitschy," "fake," "temporary," "terrifying," and "trash."

A closer investigation of Thames Town and its ilk reveals, paradoxically, that in the way it copies the West, China's duplitecture manifests a tremendous originality.

Though the forms of these replicas are old, the Chinese have appropriated these historic models to convey entirely new ideas and serve distinct uses these buildings never had before. The recreation of these structures—as familiar as they are—on China's soil transforms their meaning and turns them into something else that is distinctively their own, and fully original. A copied White House in China is less a symbol of American power or celebration of democratic ideals. Instead, it has been co-opted as a testament to China's strength and achievements.

China's architectural mimicry also challenges the view of replication as something abhorrent and taboo, suggesting ways that imitation can lead to novel outcomes and concepts. The nation's fondness for architectural replicas can help us understand copying as a source of creativity and ideas, as these copycat communities show signs of being a springboard for invention.

opposite Thames Town's cathedral—a direct copy of the Christ Church in Bristol—draws so many Chinese couples posing for wedding portraits that a prop table adorned with a fake wedding cake, bottle of champagne, and basket of baguettes remains standing in front of it at all times.

For the Chinese residents of these themed enclaves, the fantasy is lived—daily, monthly, yearly.

For the Chinese residents of these themed enclaves, the fantasy is lived—daily, monthly, yearly.



above In the suburbs of Hangzhou, China, the greatest hits of Parisian architecture have been recreated almost brick-for-brick in a sprawling residential development complete with churches and carriage rides.



above Real estate agencies in Shanghai's British-inspired Thames Town lure potential buyers with the promise that they can "Dream of England. Live in Thames Town." Security guards patrolling the property—a mix of Gothic, Tudor and half-timbered buildings—wear uniforms inspired by those of the Queen's Foot Guard.

"On the one hand, you're making something look like something that came before. On the other hand, you're creating something absolutely new and totally of its time," says Sam Jacob, an architect who built a Museum of Copying for the 2012 Architecture Biennale. "[Copying] is incredibly fertile. It's a way of quickly breeding ideas, and it's a way of bringing in far too much, far too soon."

Other cultures, including the United States, have been avid copycats at points in their own history. Yet China's replicas are firsts in their own right: no nation has replicated at the same speed or scale, while also pulling from cultures so far afield from their own. In the United States, for example, architectural knockoffs (built by the founding fathers and straight through to the present day) have been based on Anglo-Saxon (British Tudor, Queen Anne, Gothic), Mediterranean, or Teutonic models. These are the architectural styles and morphologies of peoples who share the same geocultural genealogy. In China, the dominant target of appropriation for residential enclaves is a geopolitically, temporally, and culturally alien civilization.

Another distinctive feature is the sheer number of these "alien" landscapes and the proportion of the total new housing stock that they represent. Where other nations—India, the United Arab Emirates (UAE), or Japan, for instance—may have only a handful of themed developments for the ultra rich, China has billions of square feet dedicated to such projects, some already completed and others under construction, offered in a range of price-points that make ownership accessible to the increasingly economically nuanced emerging middle class. Fueled by rapid economic growth, a population of over 1.3 billion, and a muscular government apparatus, China's importation of "prestige" historical architecture from the West is occurring on an unprecedented scale.

In its present iteration, the originality of these landscapes consists also in the novel circumstances of the historical moment in which this architectural mimicry is occurring. Specifically, China is seeking to reposition itself within a dynamically changing world in which forces of economic interrelation, environmental degradation, and technological

right The gargantuan villas at Beijing's Palais de Fortune development have been built with materials imported from France and have each been named after prized symbols of French culture, from "Louvre" to "Versailles."

"On the one hand, you're making something look like something that came before.

On the other hand, you're creating something absolutely new and totally of its time"

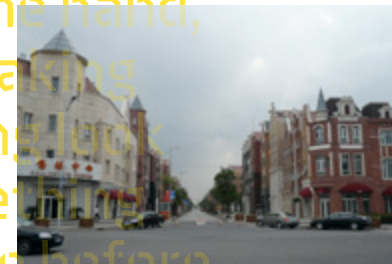
"On the one hand, you're making something look like something that came before.

On the other hand,



below left Doubled Dutch: Shanghai's Holland Village is dotted with windmills, decorated with planters full of plastic tulips, and lined with townhouses done up with dormer windows and tiled spires that evoke the Netherlands in China's suburbs.

below right Hangzhou's self-described "Oriental Paris" stages wedding ceremonies in its yellow "Hilltop Castle," which stands perched on a hill above the development's "Little French Town," a collection of shops and cafés for visitors or homeowners to stop by after touring an amphitheater modeled after the arena of Nîmes in southern France and bordered by parterre gardens of the type that decorate the grounds of the Palace of Versailles.





above China's carbon-copy of Venice offers Italian-inspired, *ladolce vita* living in town-houses overlooking a network of manmade canals on which "gondoliers" navigate gondolas under stone bridges.

left The crown jewels of Hangzhou's Venice Water Town residential development are the town's replicas of Venice's most iconic landmarks: the ornately-tiled Doge's Palace and the bell tower of Saint Mark's Basilica.

advance are accelerating global interdependence; redrawing the balance of power among the superpowers; and redefining notions of economic and political superiority. The technology available to China for copying alien lifestyles sets it apart: it has the mechanical and infrastructural capability to create cities virtually overnight. It also has the financial resources to underwrite massive housing projects, recruit foreign consultants, and import expensive materials. It has a powerful government able and willing to support urban planning projects of extraordinary scales. And it has a client base for these developments—a growing middle class that includes a population of between 100 million and 247 million consumers and that is projected to encompass 40 percent of China's total population by 2020.

Though on the surface these duplitecture developments look Western through-and-through, they are also manifestations of a uniquely Chinese view of replication that has its roots in traditional philosophical systems. The ontological status and value of the copy in China differ substantively from corresponding Western notions. The West, obsessed with the question of primacy, has largely embraced the original as legitimate and connoting technological supremacy, while rejecting the copy as inferior, tainted, and subversive. By contrast, copies have traditionally occupied a far more nuanced status in China: though originality is prized, replication is not only permitted, but has historically been praised as testament to cultural and technological achievement.

This cultural esteem for the copy, which has helped foster a permissive climate for such copycat constructions, is rooted in the cyclical imperial worldview, in Zen cosmology, and in imperial politics. In pre-modern China, for example, copies were the *en vogue* status symbols of the day. China's rulers relied on replicas to broadcast their strength, creating enormous hunting parks that assembled imported plants and rocks to mimic the landscapes of well-known locales. These leaders hoped to show they were so mighty, they could move heaven and earth at their command. China's first emperor, Qin Shi Huang, even commemorated his conquest of six rival kingdoms by building replicas of their palaces within his own capital city.

This tradition of conferring merit to replicas suggests that China's copies serve as more than just functional objects. Instead, they are also symbolically important structures that serve as monuments to China's rise. In the grip of a massive and comprehensive transition, the Chinese have seized on the iconography of Western architecture as a potent symbol for their ascension to—and aspiration for—global supremacy and the middle-class comforts of the "First World."

Moreover, the replication of Western cityscapes acts as a signifier of the nation's advanced state of development, made manifest through its ability to replicate Western landscapes, technology, and forms. The knowledge and familiarity with the West implied in the construction of historical architectural types—Versailles, Venice, and ye-olde-England—offers testament to China's erudition and thorough understanding of the "other." In this ability to master the technology, design, and order of the West, the architecture fulfills a symbolic function as a sign of parity (economic, cultural, and social) with the top Western competitors.

"There is a very important symbolic value to this [duplitecture] architectural movement," says Howard French, a former *New York Times* China correspondent. "It is a statement of having arrived, of being rich and successful. It says, 'We can pick and choose whatever we want, including owning a piece of the West. In fact, we're so rich we can own the West without even having to go there.'"

But there are more pragmatic drivers of this movement as well. China has embraced imitation in the hopes that it will lead to innovation, and already, there are signs this strategy is succeeding.

Chinese officials involved in the support and sponsorship of China's duplitecture maintain that by copying Western models, China gains experience and expertise in Western construction and design that allows it to advance more quickly. Consider the Shanghai Urban Planning Bureau's rationale for the European style of the "One City, Nine Towns" plan, a 2001 government initiative that erected ten European-style towns, including Thames Town, around the metropolis. The government officials stressed the opportunity to learn from international experience and use it to China's advantage in much the same way that Western intellectual property is being appropriated as it relates to manufacturing smartphones, or pharmaceuticals. The planning memorandum on the development of Shanghai notes, "As we enter the twenty-first century, we must draw on the successful expertise of foreign nations to achieve a high-quality planning model, high-quality construction, and a high level of efficiency, constructing several types of towns, each in a unique style." The bureau even proposed offering financial subsidies to lure foreign architects and planners into the building and design processes.

This strategy of seeking out the best achievements of alien cultures and applying them, through selective adaptation, to meet domestic needs and to solve domestic problems has characterized China's approach to technological change in the past. The Chinese have "eagerly acquired all the technical discoveries of the foreigners," observed Johan Gunnar Andersson during his travels to China in 1928. Xing Ruan, professor of architecture at the University of New South Wales, points out that the tendency

to embrace the skills of outsiders when they stand to benefit China runs deep in the nation's history and forms a part of its cultural character. "The Chinese basically have no problem with accepting something 'alien,' 'exotic,' or 'Western' if these things are considered to be at the 'center of the cosmos.' These days, we're talking about Western civilization and the Western image as being the representation of that," Ruan says. The architecture and engineering of the developed world are seen as promising solutions to China's rapid urbanization and thus have been both studied and emulated by local developers and architects. By importing the "hard skills" of Western urban planners, designers, business people, and engineers, the Chinese are betting that the experience of foreign experts and the replication of globally acknowledged jewels of urban design will bring about the nation's rapid transformation into a global leader and will ensure the continuation of its "peaceful rise." This is learning by doing at its most massive.

China's duplitecture shows signs of being a stage in the nation's transition from imitative to innovative, and may even accelerate this progression. Already, there is originality even in these copycat landscapes. The ingenuity required to create credible copies of Venice or Paris is impressive. In constructing a British hamlet like Thames Town, the Chinese architects actually developed novel processes and approaches to build something that appears old. Beneath their brick and half-timbered exteriors, the

buildings of Thames Town actually hew to a more Brutalist style: they were not made of the traditional materials English architects would have used, but created from cast concrete. Neither do the homes completely disassociate from their home turf. Elements of traditional Chinese vernacular architecture have been incorporated even in places like "Majesty Manor," "Palais de Fortune," and "Blue Cambridge." It's not unusual to find Baroque or Beaux-Arts exteriors on homes with interior courtyards, deep consideration for *fengshui*, and surrounded by classical Chinese gardens.

Numerous other artistic fields, from painting and poetry to jazz composition and fashion design, have relied heavily on imitation as a form of inspiration that stimulates new ideas and forms. So why not architecture? It may not be typical for architects and planners to copy their way to creativity the way an aspiring painter sketches the masters to hone his style. But perhaps that is only because no other nation has been able to erect, experiment with, and copy buildings at the rate of China, with its deep pockets and plentiful labor. In this sense too, the duplitecture represents a novel undertaking. China has the opportunity to play with architecture the way musicians sample music, or technology companies try copying their way to market dominance. The ultimate result of the copycat binge could well be a distinctive, creative architectural language that is all China's. Or maybe we're looking at it: probing deeper into China's duplitecture reveals an original undertaking that, in a plethora of ways, is the first of its kind.

As a Thames Town homeowner observed, "The hardware may be all Western, but the software is all Chinese."

Gold statues, brightly colored paint, wrought iron balconies, and white columns lend a European air to the Baroque-style townhouses at the San Carlos development, which brands its residences as "platinum palace villas" that are "tasteful," "quiet," and "sumptuous." Its slogan trumpets the community—which was still being built in 2008—as "Baroque Romantic since 1715."



"The hardware may be all Western, but the software is all Chinese."

"The hardware may be all Western, but the software is all Chinese."

"The hardware may be all Western, but the software is all Chinese."

with me

Manifesto by

**Urtzi Grau and
Cristina Goberna**

from

Fake Industries Architectural Agonism

As any other creative discipline, architecture is subjected to a regime of originality. Yet, operations having in common the recourse of already produced forms—well-known critical tools in a wide range of artistic production—still remain unabsorbed and even taboo. While imitation and reproduction are the obvious roots of the last twenty—if not the last six hundred-years' excess of architectural shapes, the field has resisted to openly embrace copies and in so doing, it has hindered its potential. To intentionally copy entails a radical reformulation of architectural imagination: it allows for a radical renunciation to form-making—since form is defined a priori—to focus on architectural knowledge yet to be discovered.



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After years repeating other architect's works, Fake Industries Architectural Agonism has elaborated a classification of forms of repetition. Tested under uncontrolled conditions and with various degrees of success, the listed operations form a constellation as inconclusive as incomplete. Our only hope is that a conscious use of some of them can open paths of exploration negated by architecture's historical obsession with originality.

To produce Architecture, please use:

appropriations,	duplicates,
blueprints,	duplicities,
camouflage,	duets,
carbon copies,	emulation,
clones,	facsimiles,
confidence-men,	fakes,
cons,	falsifications,
copies,	forgeries,
counterfeits,	frauds,
couples,	generics,
deceits,	illusions,
deceptions,	imitations,
decoys,	impersonations,
delusions,	likenesses,
détournements,	look-alikes,
disguises,	mash-ups,
doubles,	masks,
doppelgängers,	masquerades,

We have been doing it for a while, and sometimes, it works.

mirages,	recycling,
mirror images,	reenactments,
mock	remakes,
documentaries,	remixes,
models,	replicas,
monkeys,	reproductions,
montages,	satire,
mystifications,	shadow plays,
objets-trouvés,	Siamese twins,
palimpsests,	similarities,
para-fictions,	simulacra,
parallels,	smokescreens,
parodies,	subtitles,
parrots,	transcriptions,
pastiches,	translations,
phonies,	tricks,
photocopies,	twins,
re-appropriations,	and voice-overs

Little in
the
Holes

Essay by Sergio Lopez-Pineiro.
Projects by Holes of Matter.

Gapos

In many ways, the design disciplines that deal with the built environment (architecture, landscape architecture, and urban design) can be described as instruments for materializing sociocultural forces into physical spaces. Like a long dinner table with its head occupied by the head of the family, the food giver, most designed products are embedded with sociocultural hierarchies. Design variables such as programs, surface areas, seasonal adaptations, or spatial adjacencies, just to name a few, are all devices through which designers assess their ability in the translation of forces into spaces. Physical spaces, in return, help shape and change traditions, rituals, and habits. Undoubtedly, most designers (architects, landscape architects, and urban designers) aspire to master this feedback loop.

Although this feedback loop between sociocultural forces and physical spaces is necessary, in many situations it can become an overpowering and inescapable condition that leaves no room for the emergence of unimagined possibilities. As a product of rational discourses, this feedback loop is constantly optimized through technical means, constantly fine tuned to current cultural meanings, constantly reassessed in its political repercussions, constantly reevaluated for its aesthetic implications, and constantly questioned for its ecological impact.

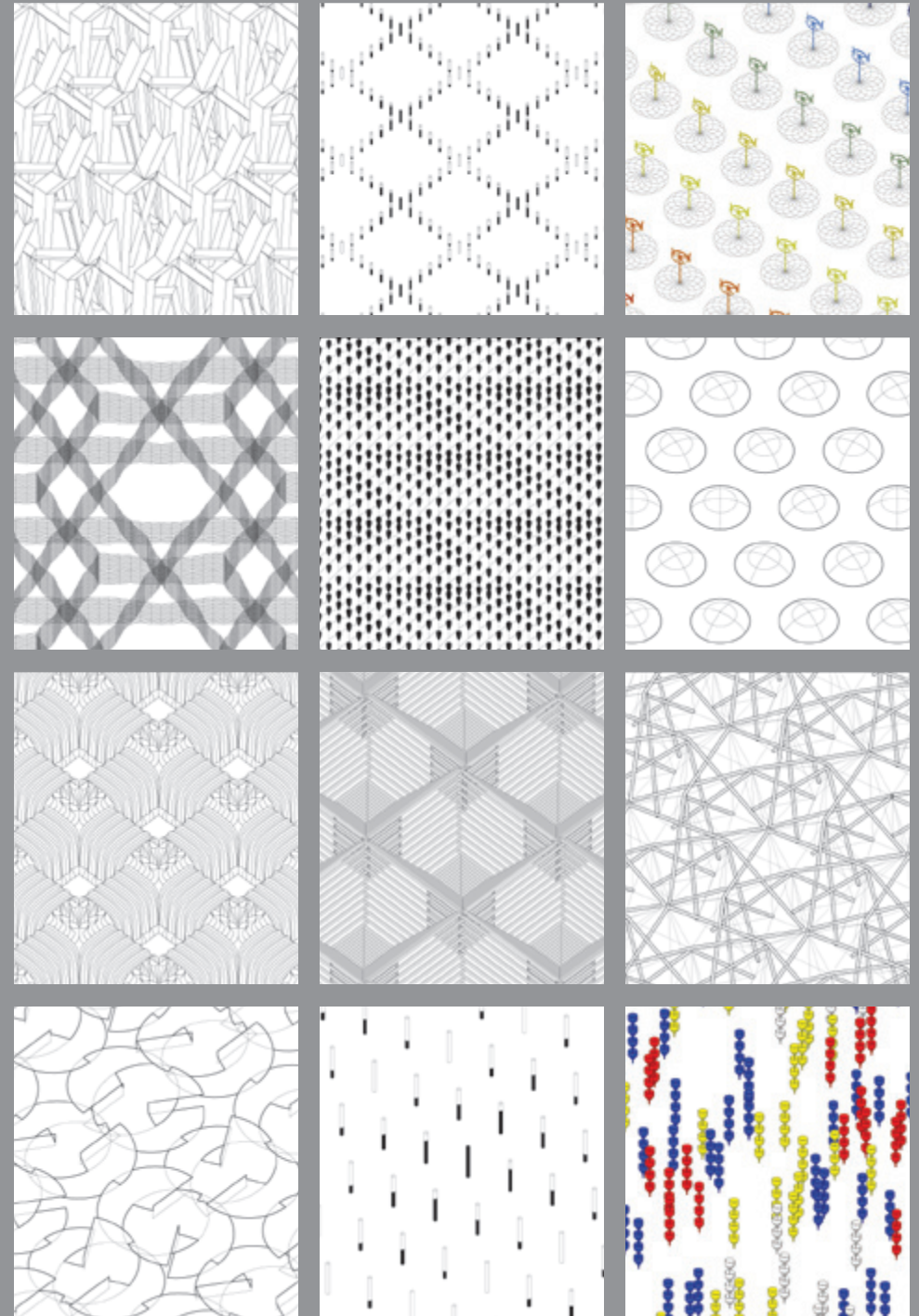
However, it is possible to prevent sociocultural structures from becoming embedded within the designed products. This liberating slippage can occur with different degrees of severity, with complete homogenization (neutrality via repetition) and full foreignness (absurdity via surrealism) as the two most extreme cases. Most of the time this disconnection is only seen as fun and temporary. Any permanent disconnection between sociocultural forces and spatial organizations is usually seen as an error. Or even worse, it gets labeled as a utopian condition.

Utopias are always proposals that escape the feedback loop between culture and space. As such, utopias exist in the gaps between sociocultural forces and physical spaces. They present a different kind of bridge between both realms that is not regulated by the standard discourses of the design disciplines that deal with the built environment.

Since these design disciplines are arguably bound by social contracts, differentiation (of spaces, circulations, materials, ecologies, etc.) is a basic design strategy in the translation of forces into spaces. Consequently, one possible utopian design

strategy would be to pursue spatial homogenization, achieving neutrality by repeating every single one of the built provisions. For example, by repeating singular elements, these lose their uniqueness as they suddenly become (just) one more element within a field; by repeating symmetries, hierarchical orders are neutralized into multiple axes, and so on. These spaces, structured as repetitive and undifferentiated spatial fabrics with no customary social structures embedded within them, are more possible than impossible, more real than ideal. As an alternative to designed products derived through the use of the feedback loop between culture and space, these fields of repeated and undifferentiated elements present a different reality, ready for the emergence of unimagined possibilities.

In this article I expose and briefly describe twelve spatial ideas that can be found in fields constituted by repeated and undifferentiated elements. Each of these twelve spatial ideas is accompanied by an image of different projects developed by my own design practice, Holes of Matter, which explores the gaps existing in the relationships between social structures and spatial organizations.

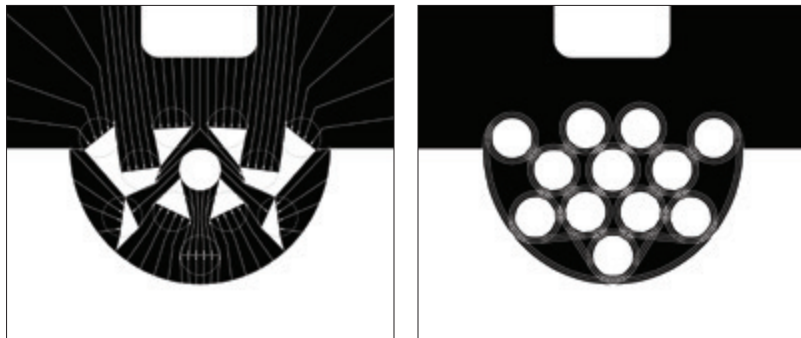


Fields

Neutral Fields

“...we therefore call Neutral the field of nonparadigmatic intensities (those introducing a trick into the paradigm), and in consequence we ask that the Neutral not be conceived, connoted as a flattening of intensities but to the contrary as a bubbling up *émoussillement* (champagne foam).”¹ Roland Barthes’ definition suggests a kind of unneutral neutrality. Neutral spaces are usually criticized as accidental and unfortunate by-products of design proposals lacking a committed political position. In order to intentionally design them, however, a designer requires a deep disciplinary knowledge as well as a decisive attitude toward achieving this spatial condition. The result can be a neutral space but the means to achieve it are not; in other words, the design process is engaged in an unneutral neutrality.

During the winter of 2010-11, *Olmsted’s Blank Snow* was a temporary winter landscape located in the parking lot of Front Park, one of the six Olmsted Parks in Buffalo, New York. With the ambition of transforming this parking lot into a winter garden, we implemented a snow plowing plan that located eleven snow mounds generated from daily plowing in positions different from the regular ones. The resulting landscape was defined by a repetitive and homogenous pattern of mounds that was significantly different from the typical continuous mound that would surround the parking lot along its outside edge. The snow plowing patterns devised for the implementation of this project could then be considered as the trick we introduced into the paradigm that allowed us to devise a new type of spatial intensity, one bubbling up into a neutral field.



Olmsted’s Blank Snow

Anaxial Symmetries

As an organizational and compositional tool, symmetry is a geometric operation that can be used to produce singular events within a structure (a distribution axis or a point of access, for example). As such, symmetry operations are regularly used to define hierarchy within organizations. But, what would happen if we were to repeat multiple symmetry operations to the extent that their results are no longer singular? The American minimalist artist, Carl Andre, defined anaxial symmetry as “a kind of symmetry in which any one part can replace any other part.”² As such, anaxial symmetries can be used to produce homogenous fields.

The interiors of factories, warehouses, and storage facilities demonstrate intense spatial qualities due to the virtual horizon line produced by the protective extra coat of paint located in the lower half of the columns and reaching up to a person’s eye-level. This accidental datum, unique to this type of building when it is completely empty, makes the visitor feel as if in an interior desert. *Scenes in a Concrete Deserta* explores the manipulation of this interior space by transforming the virtual horizon line into a series of homogeneously distributed virtual volumes repeated through multiple (anaxial) symmetry operations.

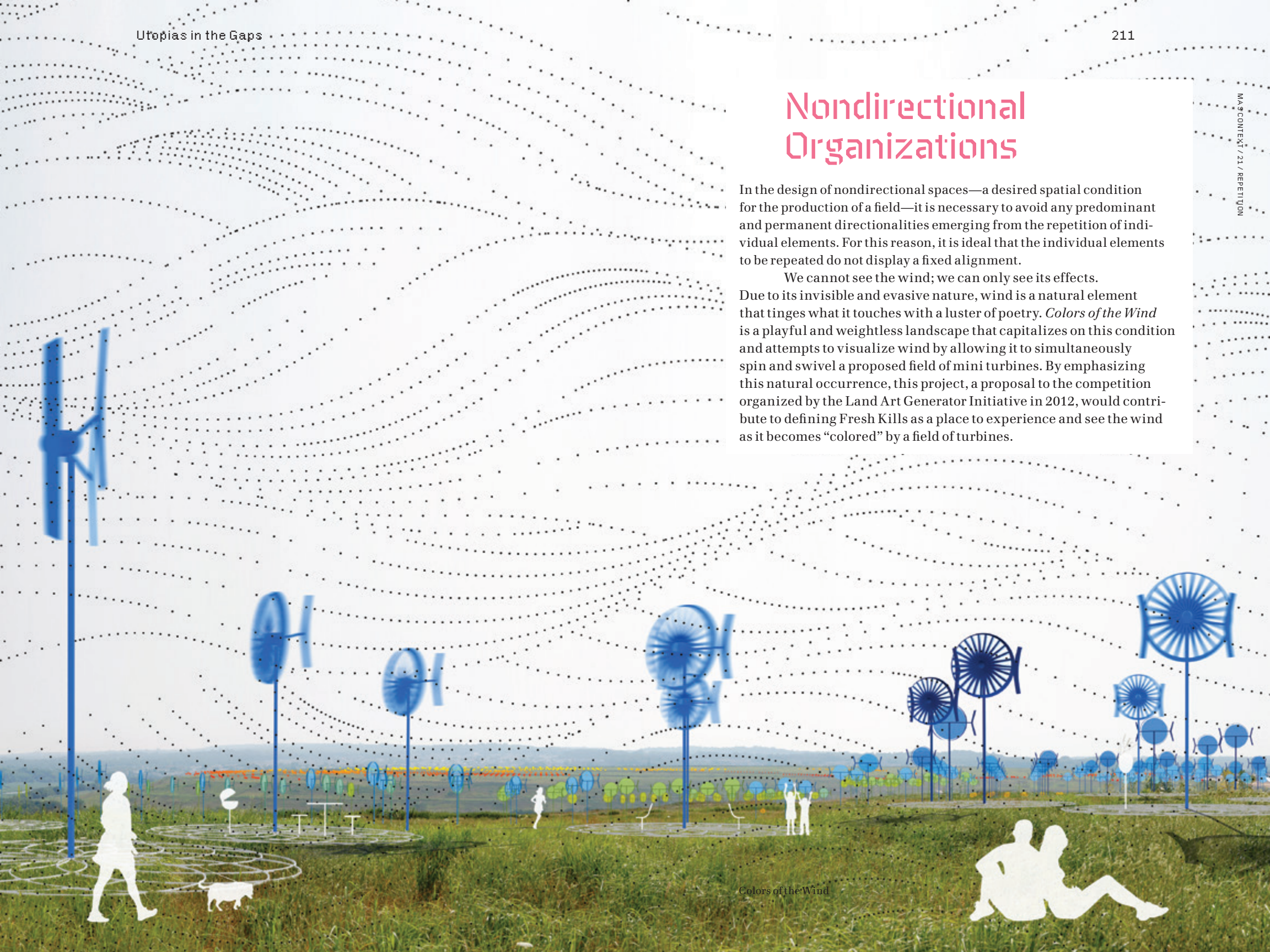


Scenes in a Concrete Deserta

Nondirectional Organizations

In the design of nondirectional spaces—a desired spatial condition for the production of a field—it is necessary to avoid any predominant and permanent directionalities emerging from the repetition of individual elements. For this reason, it is ideal that the individual elements to be repeated do not display a fixed alignment.

We cannot see the wind; we can only see its effects. Due to its invisible and evasive nature, wind is a natural element that tinges what it touches with a luster of poetry. *Colors of the Wind* is a playful and weightless landscape that capitalizes on this condition and attempts to visualize wind by allowing it to simultaneously spin and swivel a proposed field of mini turbines. By emphasizing this natural occurrence, this project, a proposal to the competition organized by the Land Art Generator Initiative in 2012, would contribute to defining Fresh Kills as a place to experience and see the wind as it becomes “colored” by a field of turbines.

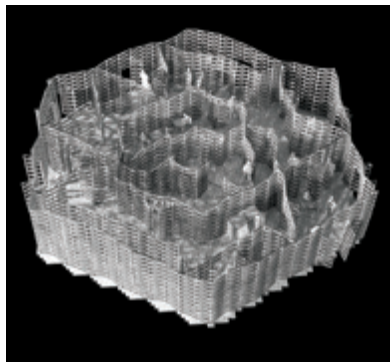


Colors of the Wind

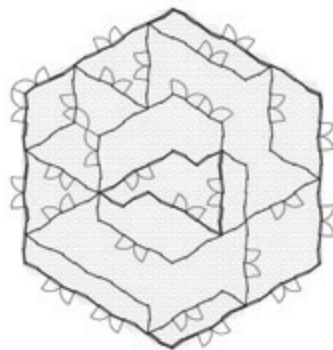
Enabling Frameworks

As *The Charged Void* shows, the Smithsons were longtime interrogators of empty but charged architecture.³ Peter Smithson expressed the idea of enabling in a clear manner: “In a way, what I am explaining is like a children’s party. The mother organizes certain possibilities for play, but whether the party goes well or not depends on the invention of the children. The mother is designing a framework.”⁴ In this manner, the spaces’ emptiness also acts as a mirror revealing the nature of the individuals whose desires are enabled.

Imprecise Infrastructure is a competition proposal for a technology media lab and library for SIDAREC, a not-for-profit organization in Mukuru Kwa Njenga—a slum settlement of Nairobi, Kenya. Slums show a poignant sense of fragility and adaptability that has inspired this design. We envision this center as an infrastructure for the slum’s artistic, cultural, and functional expression: rooms are defined by a concentric system of blank fences that users can appropriate as they see fit. The fences can be covered to define areas to privacy; they can be used to hang artwork produced by SIDAREC’s members; notices and advertisements can be clipped onto the fences in order to establish a fluid communication amongst the members of the community. The proposed system of walls, which is homogeneously repeated to define every single space of the building, is designed with multiple tolerances in an attempt to overcome potential problems such as the lack of specific building materials or specialized labor. Furthermore, this system of layers would also enable SIDAREC to build their building in phases as materials, funding, or time become available. The resulting building is delicate yet with a strong character and exhibits an image that is aligned with the mission of SIDAREC.



Imprecise Infrastructure



Flexible Frames

“What is ‘the architectural’ in an edifice? We can begin to answer this question by noting that, strictly speaking, architects design frames.” Bernard Cache’s description in *Earth Moves: The Furnishing of Territories* has the summarizing power of a maxim. Deriving his ideas from Eugène Dupréel’s notion of the frame of probability—as an interval that separates causes from their effects—Cache further elaborates proposing architecture as “the art of introducing intervals in a territory in order to construct frames of probability.”⁵ That is, architects design frames that cannot be considered the direct cause of the events that happen within them. Consequently, and following this reasoning, it could be argued that flexibility is not a temporary architectural quality but rather a sine qua non condition for the existence of architecture.

Painted Topography is an installation located in the ground floor of the derelict American Flour Warehouse in Silo City, Buffalo. In this project, the existing structural frames are visually reconfigured by means of a repetitive painted topography. The resulting interior landscape is a form of newly “renovated” industrial space that is available to be occupied by different types of events. These events may or may not react to the spatial conditions newly defined by the wavy painted topography.

Painted Topography



Hairless Holes

Physicist John Archibald Wheeler's dictum "black holes have no hair"⁷ implies that besides the information derived from three basic parameters (mass, electric charge, and angular momentum) no other information about the matter that formed a black hole alters its external image. In other words, the content of a black hole remains invisible to an external observer; and, reversely, the image of a black hole remains constant regardless of the black hole's contents. Similarly, it could be argued that spaces defined by structural repetition have no hair either. Despite a generalized criticism against this design approach, these spaces show a strong resilient image, as they always look the same regardless of their permanent or temporary occupancy.

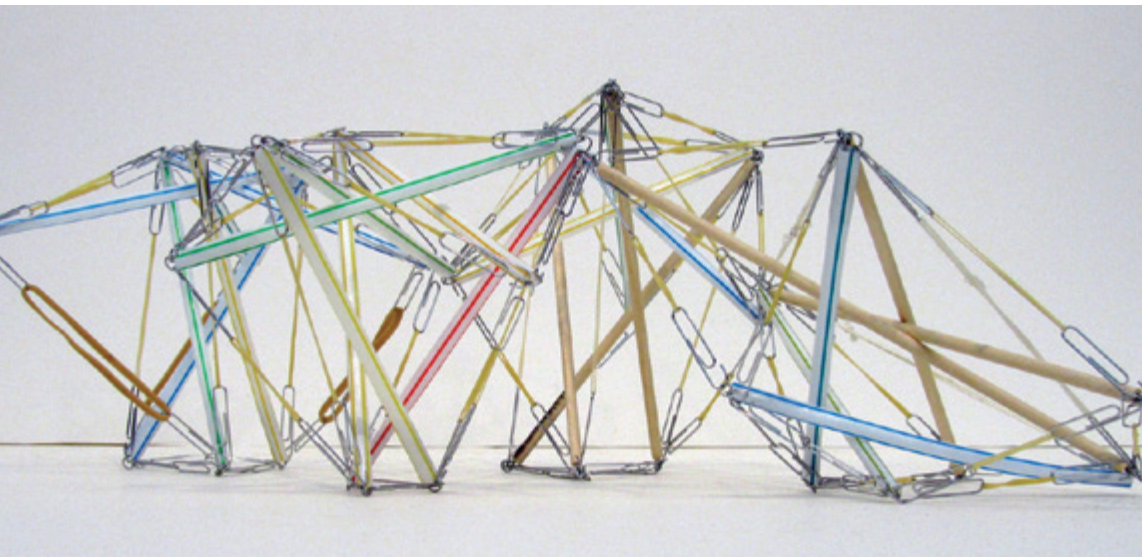
In cold cities, running and exercising outdoors during the winter months can be an arduous task: ice, snow, and low temperatures make it difficult to freely roam throughout the city. *Blue Rainbow* is a proposal for a new type of indoor/outdoor landscape. This project proposes transforming abandoned parking structures into playscapes for year-round use by placing color bands of a synthetic track-like layer over the existing concrete surface. With its tints of color, the *Blue Rainbow* emphasizes the repetitiveness of these parking structures while infusing them with a new spatial intensity, all without altering the parking structure's exterior image.

Homogeneous Repetitions

True spatial homogeneity is difficult to achieve as singular elements (a column, a drain, or a main door, for example) tend to disrupt the spatial continuum, creating singularities (structural, functional, environmental, and of other kinds) throughout the space. One design technique for making them lose their singleness is to multiply and evenly distribute them throughout the space. The result will be a homogeneous field of (originally singular) repeated elements. Many of the projects developed by Archizoom Associati—in particular *No-Stop City*—are good examples of this homogenizing technique as wiggly walls, bathrooms, and closets are homogeneously repeated and distributed through the structural field. The neutral qualities of the resulting field become immediately apparent since the lack of any singular elements eliminate any sense of hierarchy within the space.

Umbrellaland is a design research project on tensegrity-like structures developed during a residency at The MacDowell Colony. A tensegrity is a structural model that finds its equilibrium on a homogeneous distribution of members and cables that are strictly working in compression or tension. Conceptually speaking, a tensegrity is a three dimensional structural field. In this regard, this project uses tensegrity-like structures to establish continuous spatial fields, ready to accept and encourage a wide array of social, cultural, and programmatic diversity.

Umbrellaland

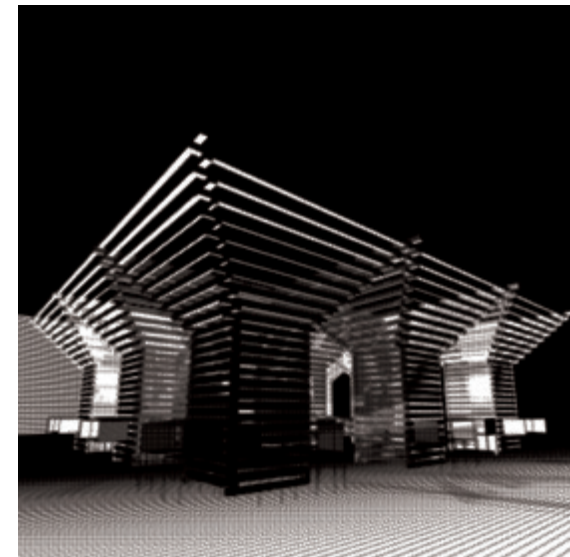
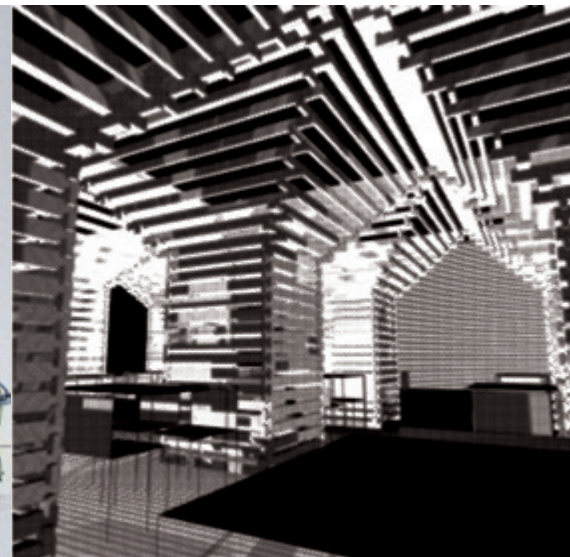


Amnesic Places

When the snow covers the ground, people realize they can move around as they see fit and notices like “Keep off the grass” or “Stay on path” suddenly become useless and irrelevant. The snow, as a relentlessly repetitive condition, renders instructions obsolete by homogenizing different land covers and erases the episodic memory of a place by covering up traces of past events. This temporary amnesia provoked by the blanketing snow opens up possibilities for new and unexpected appropriations.

Urban Shade Field is a competition proposal for an outdoor shaded patio. The proposed open-air shading structure will contribute to the new emerging identity of Detroit’s “Avenue of Fashion” while defining a flexible outdoor space capable of offering multiple programmatic possibilities. This structure is composed of nine repeated modules—each one measuring approximately 11x11x11 feet—and will be placed in the center of an abandoned lot measuring 40x80 feet. As a new fresh layer of snow, this project attempts to blanket the space, offering new possibilities for its occupation.

Urban Shade Field



Places in Limbo

Besides being the title of one of their books, “areas of impunity” is an expression used by architects Iñaki Abalos and Juan Herreros to describe their work.⁸ Areas of impunity are:

“Those sites in which the practices of a new civil society coalesce.... Areas of impunity are opportunities for developing programs free of restrictions and hierarchies, centers or rhetorical figures; they are opportunities and programs (to be invented, for the most part) in which the modes and practices of the new social subject can be developed... They operate neither through reform nor criticism: they coalesce through the varied use of contemporary techniques, in contexts and with a physicality different from traditional ones. They seek to isolate the system of social regulation prevailing today, which produces the new subject and his practices, fields that are free from domination, new political spaces selected from the hybridization of culture, production, and leisure.”⁹

Repetition provides a valid means for establishing a strong spatial identity without relying on sociocultural forces. Unplanned and spontaneous events taking place in these neutral spaces, however, do not define a permanent narrative. And without fixed and permanent narratives, these neutral spaces tend to be located outside of space and time: they are in limbo. Due to their limbo status, these neutral spaces could be taken over by different forms of authority, potentially transforming them into spaces of domination. However, if they were to be protected, that is, if their limbo status was to be protected, these spaces could be perceived as refuges from sociocultural norms, allowing occupants to imagine new unexpected possibilities or to invent hybrids from the already existing ones.



Painted Topography

Random Occurrences

A certain amount of randomness within a stream of multiple repetitions is all that might be required to design. For example, π , e , and $\sqrt{2}$ are all irrational numbers and consequently, their decimal representation never ends and never settles into a permanent repeating pattern. Although no proof of this has yet been discovered, it seems that these numeric constants also appear to be absolutely normal numbers—that is, numbers that are normal to every base and whose digits appear to be randomly distributed. If this were the case, every possible combination of numbers would exist somewhere within each of these numeric constants. That is, all the information of the universe, both true and false, both past and future, could be contained within them. In summary, random decisions might be all a designer needs as long as the field of repeated elements is large enough to accept a certain amount of them.

Hypostyle Garden is a proposal to rethink the traditionally horizontal flower garden as a forest of flowers. As a renewal of this garden, this project presents flowers arranged in vertical piers, constructed out of steel funnels—oil, chemical, and rust resistant—regularly used in the automotive industry and placed in a seemingly random manner with open spaces between them. The selected flowers (Lanceleaf Coreopsis, Blanketflower, Dotted Mint, and White Asper) are all local wildflowers with vivid colors and smells that attract butterflies. Since they all have similar growing needs—full sun and sand-based soil—this would be an easy to grow and maintain garden.

Hypostyle Garden

Additive Systems

The design of a spatial field is an allegation against “Bigness.”¹⁰ As a singularity within the urban fabric, “Bigness” promotes formal intensity through its sheer size. Rather than relying on a singular object, the design of fields involves the repetition of one or multiple elements. In the design of fields, elements are added rather than enlarged or diminished in size. In doing so, the intensity is not achieved through one large singular element but rather by an array of intensities created through the variation of the elements added.

The mini turbines that configure the landscape of *Colors of the Wind* are each colored with a specific tone according to their altitude: Pantone PMS Warm Red 2X for elevations of up to 39 feet, PMS 485 for 40-49 feet, PMS 172 for 50-59 feet, PMS 1655 for 60-69 feet, PMS 021 for 70-79 feet, PMS 716 for 80-89 feet, PMS 151 for 90-99 feet, PMS 143 for 100-109 feet, PMS 114 for 110-119 feet, PMS 101 for 120-129 feet, PMS 291 for 130-139 feet, and PMS 7455 for elevations above 139 feet. The overall effect of this operation emphasizes the possible variations that can emerge through a field of repeated elements.

Colors of the Wind

Blank Spaces

Emptiness is a temporary condition. Blankness, however, is a permanent spatial property as it eliminates the connection between spatial organizations and social structures. A double-headed table, for example, can be empty at any given moment but it will not be blank regardless of its temporary inoccupation—as its predominant orientation implies a social hierarchy. This spatial property is seen by many as a design error as it questions what many designers consider to be design's ultimate purpose: the making of a place.

The Perfect Human is a short film from 1967 by Jørgen Leth. It portrays a couple (female and male) as the perfect humans in a boundless and empty white room with no horizon line. Depending on the needs of the perfect humans, several pieces of furniture progressively show up in the room throughout the film. An off-screen voice describes and reflects on what happens on the screen. For instance, the room occupied by the perfect humans is described by the voice as “boundless and radiant with light. It is an empty room. Here are no boundaries. Here is nothing.” The perfect humans live alone in a boundless blank room, out of place and time.

In 1971 George Lucas directed his first feature-length film, *THX 1138*. It presents a dystopian future of an underground city inhabited by citizens that are drugged in order to control their emotions. A factory worker, THX 1138, is sent to jail when he stops taking his daily drug dose and, as a consequence, falls in love with his roommate, LUH 3417. The prison is contradictorily presented as an endless and almost shadowless white interior with no horizon line: prisoners can go wherever they want but there is no place to go. This prison is a blank space lacking all structure—physical, temporal, or social.

Strangely enough, the perfect humans' home presents an identical spatial condition to THX 1138's prison. Both of these blank spaces are horizontally isotropic and, consequently, their uniformity is achieved by the infinite repetition of a single spatial condition. So, the perfect human lives in a prison then? Probably not. But, precisely because of this mismatching, should we not perceive this utopian space as a revealing gap in the relationships between sociocultural forces and physical spaces?

Acknowledgments

I would like to thank Thomas Kelley for his invitation to present at “On Error”—a symposium he organized at the University at Buffalo School of Architecture and Planning during his 2012–13 Banham Fellowship—as it was at this venue when I first tested many of the arguments contained in this article.

Credits

Fields.

Drawings: Joshua Graham, Sergio Lopez-Pineiro.

Olmsted's Blank Snow.

Designers: Nicole Halstead, Sergio Lopez-Pineiro. Execution: Buffalo Olmsted Parks Conservancy, Buffalo, New York, USA.

Sponsors: 2010 Independent Projects Grant, New York State Council on the Arts (NYSCA), New York, USA [Grant support]; Buffalo Olmsted Parks Conservancy, Buffalo, USA [Fiscal sponsor].

Scenes in a Concrete Desert.

Designer: Sergio Lopez-Pineiro. Sponsor: Department of Architecture, School of Architecture and Planning, University at Buffalo, Buffalo, New York, USA.

Colors of the Wind.

Designers: Sandra Berdick, Sergio Lopez-Pineiro.

Imprecise Infrastructure.

Designers: Kin Chun Ma, Sergio Lopez-Pineiro, Saki Yoshimura.

Painted Topography.

Designer: Sergio Lopez-Pineiro. Execution: Sandra Berdick, Angel Cruz, Sergio Lopez-Pineiro. Sponsor: Silo City, Buffalo, USA.

Blue Rainbow.

Designer: Sergio Lopez-Pineiro.

Umbrellaland.

Designer: Sergio Lopez-Pineiro. Sponsor: The MacDowell Colony, Peterborough, USA.

Urban Shade Field.

Designer: Sergio Lopez-Pineiro.

Hypostyle Garden.

Designer: Sergio Lopez-Pineiro.

Endnotes

- 1 Roland Barthes, *The Neutral* (New York: Columbia University Press, 2005), 197.
- 2 Carl Andre, “Symmetry” in *Cuts*, ed. James Meyer (Cambridge and London: The MIT Press, 2005), 275.
- 3 Alison and Peter Smithson, *The Charged Void: Architecture* (New York: Monacelli Press, 2001).
- 4 Catherine Spellman and Karl Unglaub, eds., *Peter Smithson: Conversation with Students* (New York: Princeton Architectural Press, 2005), 81.
- 5 Bernard Cache, *Earth Moves: The Furnishing of Territories* (Cambridge and London: The MIT Press, 1995), 22.
- 6 Ibid., 23.
- 7 Charles W. Misner, Kip S. Thorne, and John Archibald Wheeler, *Gravitation* (San Francisco: W. H. Freeman, 1973), 875–876.
- 8 Iñaki Abalos and Juan Herreros, “Areas of Impunity and Vectorial Spaces,” in *Areas of Impunity* (Barcelona: Actar, 1997), 188–207.
- 9 Ibid., 206.
- 10 Rem Koolhaas, “Bigness, or the problem of Large” in *S, M, L, XL, Office for Metropolitan Architecture*, ed. Rem Koolhaas and Bruce Mau (New York: Monacelli Press, 1995), 494–517.

Building Repetition Through History: Motivations And Implications

Repetition in architecture is often related with suburban homes. In the photo, repeated houses in Cincinnati use the same design to reduce costs.
© Derek Jensen



Thanks to the replica of the Altamira Cave, it is possible to show the paintings to visitors without endangering the originals. © Rapilor

Everyday Repetition

Every day, we use repeated objects. The coffee cup's design is repeated for millions, as is the bike that gets us to work, the clothes we wear, the planes that take us into the sky... These objects are exact replicas, made through industrialized processes of repetition in order to produce cheap pieces. In art, Andy Warhol explored and exploited the concept of repetition, putting art close to business. By repeating a successful painting with very small investment, he discovered, the benefits would radically increase.

What about architecture? When repetition in architecture is named, large streets of suburban houses or prefab homes appear in society's imagination, repeated in order to reduce costs of design and production. But throughout history, some buildings have been erected as a copy of another construction with different purposes than the economic.

Approaches to Repetition in Architecture

Anastylosis, decontextualization, industrialization, and tribute are just a few methods to erect a repeated building. But what is the relation between replica and original? And what is the rationale for building a replica? This research explores historical and contemporary examples of identical buildings, the motivation for their construction and the relation between the original and the copy.

When repeating a building, there are two aspects essential to understanding it. One is the localization. There are three different possibilities: in the same place, as in reconstructions; decontextualized, in a very different site from the original; and contextualized, not in the same location, but in a similar one next to the original building. The other aspect is the technique used to construct the repetition. The anastylosis allows the reconstruction of a building with its own debris, the original techniques to preserve the materiality, and with contemporary materials, too.

Repeated Buildings

Altamira's UNESCO World Heritage-listed cave, located near Santillana del Mar in the North of Spain, houses one of the most important Paleolithic paintings. The increasing amount of visitors endangered its conservation, so the Ministry of Culture decided to close the cave to the tourists. As a replacement, and to maintain the educational work, an exact replica was built inside a museum, close to the cave, using the original painting techniques. There are another two repetitions of the cave, one at the National Archaeological Museum of Spain in Madrid, and another one at the Deutsches Museum in Munich. Plus, there are replicas of part of the replicas at the Shima Spain Village in Japan and at the Prehistory Park in Teverga, Asturias, in the north of Spain.

To conserve and protect the original cave, it was completely repeated three times and these were then repeated in part two other times. This effort helped people from all over the world to contextualize the prehistoric art without endangering the cave paintings. This is an extreme case of repetition, with five replicas all over the world.



The twin churches of San Antonio de la Florida in Madrid have been together for almost a century. Now it is difficult to know which one is the original and which the replica. © Carlos Delgado



The Valencian gothic building of the Lonja had repetition in Chicago (bottom). As it was built without the left addition, a new façade had to be designed. © Public Domain. Unknown author

In Spain there exists another case of conservation, but with only one repetition, next to the original. The original chapel of San Antonio de la Florida, in Madrid, was finished in 1798. Francisco de Goya, one of the most important Spanish painters, was responsible for its inner decoration. In order to protect the paintings from the pollution produced by altar candles, a replica of the building was built in 1925 next to the original one, which housed the mass. The replica changed the composition of the original space, turning the axial-centered place into a symmetrical one.

The main motivation to repeat the original building was to conserve Goya's work, as the building was declared a national monument. This process brought the transformation of the original chapel into a museum.

A similar case of a repeated building, one used as an exhibition, occurred at the Spanish Pavilion at the World's Columbian Exposition Chicago in 1893. The Spanish government decided to build a replica of the 15th century Lonja from Valencia,

a late Gothic civil building. Rafael Guastavino, a Valencian architect working in the United States, was commissioned to design the Spanish Pavilion at the Exposition due to his experience with vaults, the constructive system from the Lonja. As we can see in the images, the building was erected without the left addition, finished 50 years after the original building. This is the reason why the architect had to design a new lateral façade that never existed. This brings up an interesting question: which is the original building? The first version, which lasted 50 years, or the final one, which lasted for 350 years?

The final purpose of the repeated Lonja was to show to the world the attractions of Spain and encourage the visitors to visit the country. With the same touristic intention, a Chinese company has copied not just a building, but a complete city close to Guangdong.



The Austrian city of Hallstatt (top) has its own replica in China (bottom). © Greymouser (top) Hanno Boeck (bottom)

Hallstatt, an UNESCO World Heritage-listed Austrian city, has a \$940 million Chinese replica. Architects, unnoticed between the numerous tourists, secretly measured all the buildings and streets for months, drawing the plans to raise the new city. This culture of copying comes from afar. In the 3rd century BC, the emperor Qin Shi Huang built a replica of the palace of every state he conquered within his capital city to show the wealth of the Empire. As if that wasn't enough, he burned to the ground the original ones.

More cases of repeated towns took place in other regions and periods, during the reconstructions in Europe after the First World War and World War II. Some cities were almost completely destroyed and rebuilt again from zero. In Warsaw, their inhabitants claimed the need to recover their identity with the vital scenario of society: the public space and its buildings. The repetition of the city was not purely archaeological, but as the collective imaginary remembered it, using the original materials available. In



The Marketplace of Warsaw after the WWII bombings (top), and after its reconstruction (bottom). © Public Domain (top) Dennis Jarvis (bottom)

1980, UNESCO included Warsaw's city center in the World Heritage list as an "outstanding example of a near-total reconstruction of a span of history covering the 13th to the 20th century."

After a shocking event, it is important to forget and carry on. This way, life will come back to normality. Something similar happened in Venice after the collapse of St. Mark's Campanile.

The tower, originally from the 16th century, was rebuilt during the early 20th century with bricks, wood, marble, and wood. In July 1902, a crack appeared in the tower and continued to grow until the building completely collapsed a few days later. The city held an international competition to rebuild the tower. Proposals offered different solutions, such as building it in a different place in the square and making a new version in Austrian Sezession style. Finally, the architect Luca Beltrami won with his motto *Com'era e Dov'era* – "As it was and where it was." So the building was repeated in the same place with the same aspect, but the

architect's investigation showed that the collapse was caused by the lack of foundations and the high weight of the construction. So the new Campanile was erected with a lighter structure made of concrete.

With his motto, Beltrami showed the importance of preserving the aspect of the buildings. However, the project did not conserve its materiality.



Aerial view of the Japanese temples of Naikū and Gekū, one in construction and another one in use. © Public Domain

In Japan, there are two shrines that have been rebuilt for centuries with the same materials. Naikū and Gekū are rebuilt every 20 years in a contiguous place, in a process called Shikinen Sengu. This shows the Shinto belief of death and rebirth of nature and the essence of impermanence of all things. During the process, the master teaches the apprentice how to build the next temple. This way, the techniques and materials have passed to the next generation for centuries. However, different fires and typhoons have destroyed the buildings several times, suffering small changes in decoration when the last building couldn't be used as a model.

In the western culture, permanence generally remains in the material continuity, while in the Japanese shrines of Naikū and Gekū, permanence flows through continuity and change. It is possible to find examples of this oriental concept in other regions, but not with its serial repetition.



The original Barcelona Pavilion by Mies van der Rohe (top) and its replica (bottom), built in the same place. The only visible differences are the stone's marks. © Public Domain (top) Jose Mesa (bottom)



The German Pavilion for the 1929 International Exposition in Barcelona, Spain was designed by Mies van der Rohe. The space was not conceived to show any exhibition. The building itself became the exhibition, featuring its structure and a single sculpture, Georg Kolbe's Alba. As a pavilion, its purpose was to last for the duration of the Exposition, so it was demolished in 1930. Over time, the building became a reference in the history of modern architecture, and in 1986, thirty years after the initial reconstruction effort by architect Oriol Bohigas, a replica of the original building was opened in the same place, with the original design, materials, and program.

But not all the repeated buildings conserve the original use. In Nashville, Tennessee, the centerpiece of Centennial Park is a replica of the Greek Parthenon. It was built for the Tennessee Centennial Exposition of 1897. Nashville's moniker is the "Athens of the South," so the authorities decided to build the Parthenon. As with the rest of buildings, the construction was not supposed to be permanent, so it was built with wood, bricks, and plaster. Its popularity let it stand until it was rebuilt in 1920, with a second, much more faithful, version in concrete. In this second iteration, numerous specialists studied the Greek Parthenon in Athens and its marble from the British Museum. In addition, the monument has a polychrome decoration, like the original was supposed to have. As a paradox, the Nashville building is closer to the original Parthenon than the ruins in Greece. In this case, is the replica a better building than the remains of the original?



The original Parthenon in Athens (top) is in worse condition than its replica in Tennessee (bottom). © Sébastien Bertrand (top) Mayur Phadtare (bottom)

Final Thoughts

As we've seen, there are several motivations to repeat a building. Altamira's cave had a simple target: allow the investigators to keep on sharing their work, without endangering the original cave. Thanks to the construction of five replicas all over the world, the scientists not only preserved the cave, but they spread their work more effectively, making it available to more people.

Is it worth visiting a replica or does it lack any soul?

Conservation is also the focus for the repetition of Goya's chapel. It conserved the paintings, allowing the residents to keep celebrating their mass in the new building and creating an attraction for visitors.

Is the repeated building more or less valuable than the original?

Tourism is a very powerful industry. Repeating buildings in different countries can make people interested in visiting the original one, which was the purpose of the Lonja. But it is also possible to use repetition to attract people, not to the original building, but to the replica. The Chinese replica of Hallstat is the recognition of success of the original one.

Is the repetition trivializing identity?

Repeating a city requires a very large investment, not always with the sole motivation of obtaining economic benefits. The case of Warsaw demonstrated that restoring the identity of a suffering society compensates the effort of reconstruction.

Has the replica the same identity as the original?

Repetition can also conserve the memories of a building, not only in the same place it was built, as the German Pavilion from Barcelona, but even on the other side of the world, like the Parthenon in Nashville.

Are these replicas real architecture, without the authenticity of the act of creation, or just giant models? Does it reduce the artistic ownership?

Japanese temples have been able to maintain the memory of the building through their constant repetition. Destruction and reconstruction are just assumed naturally.

What is important in a building, its materiality or its image? Which characteristic is the original one?

After all these examples, a question sums up the rest: Is it even possible to repeat a building?

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**Well, what
if there is no
tomorrow?
There wasn't
one today.**

**“Groundhog Day is a film
that finds its note and purpose
so precisely that its genius may
not be immediately noticeable.
It unfolds so inevitably, is so
entertaining, so apparently
effortless, that you have to
stand back and slap yourself
before you see how good
it really is.”**

Text, photograph,
and pattern by James Goggin

Concealed Carry, Repeat

On July 9, 2013, Illinois became the last state in the US to allow carrying firearms in public with the passing of 430 ILCS 66, the Firearm Concealed Carry Act. The new law, which came into effect on January 5, 2014, establishes the concealed carrying of firearms as a new status quo. Any private properties (excluding residences) wishing to prohibit firearms on their premises are required to deliberately opt out by “clearly and conspicuously” posting an Illinois State Police-approved sign at the distinctly unclear and inconspicuous size of 4 × 6 inches (roughly that of a postcard or bumper sticker). A PDF of the official sign is available for download at bit.ly/1n38ovy.

My first sighting of the sign in the wild was at the entrance of my daughter’s elementary school, on the first day back in the new year. This is the kind of situation where the sign and this new law, combined with all-too-fresh memories of tragedies across America, really hits you. On a recent visit to the Illinois Institute of Technology’s College of Architecture, the “no firearms” symbol took on more monumental proportions: even a National Historic Landmark like Mies van der Rohe’s S.R. Crown Hall needs the bluntly slapped-on reminder: no guns, please.

Here are the sign’s design rules as specified by the Illinois State Police: a uniform design with a white background; no text; a depiction of a handgun in black ink with a circle around and diagonal slash across the firearm in red ink; the circle set 4 inches in diameter. When printed, a black frame surrounding the “no firearms” symbol must measure 4 inches from top to bottom and 6 inches from left to right.

What the State Police rules do not specify, however, is how many of these designs one might post clearly and conspicuously. By tiling the sign in state-approved 4 × 6 inch brick-like modules, any desired space could be filled with an infinitely repeating “430 ILCS 66” pattern. Such a pattern might then be used to completely fill a window. It may function as wallpaper. It could even cover an entire façade.

An act of repetition like this is open to interpretation: it provides emphasis, it produces decoration, it constitutes protest. You might argue that the “no firearms” sign, if repeated everywhere, would become monotonous, ultimately risking a transition from conspicuous to inconspicuous. Even invisible. But this kind of inverse firearms-free status quo, where “no firearms” is the default, sounds pretty good to me.

S.R. Crown Hall, Illinois Institute of Technology,
College of Architecture, January 2014



Pursuant to
ILCS 66/65



Pursuant to
430 ILCS 66/65



Pursuant to
430 ILCS 66/65



Pursuant to
430 ILCS 66/65

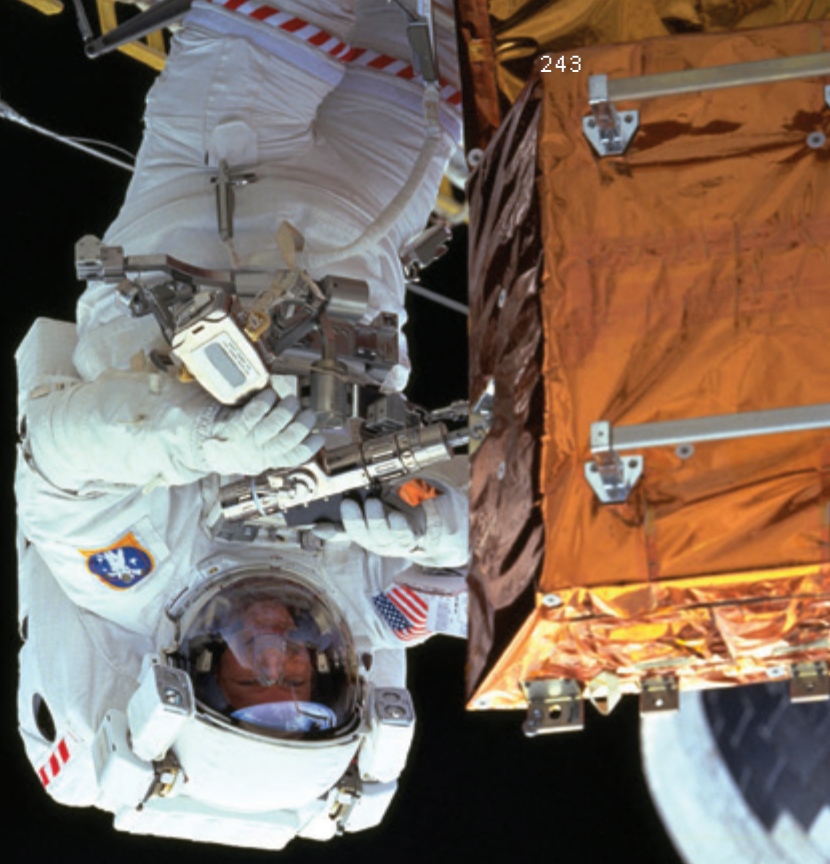



Pursuant to
430 ILCS 66/65



Claude, are you Dreaming, or is this Really Happening?

Iker Gil interviews Claude Nicollier





A veteran of four space flights, Claude Nicollier was the first astronaut from Switzerland. Over his thirty-year career as a European Space Agency (ESA) astronaut, Claude has logged more than 1,000 hours in space and has flown as a mission specialist on STS-46 in 1992, STS-61 in 1993, STS-75 in 1996, and STS-103 in 1999. He was the first European to train with the National Aeronautics and Space Administration (NASA), as well as being the first European to go on a spacewalk from the Space Shuttle in 1999. Retiring from the ESA in 2007, Claude has remained at the forefront of flight innovation with his current role as Head of Flight Test for the solar-powered Solar Impulse aircraft. We took the opportunity to talk to him about the simulation and repetition involved in preparing for a space mission, the value of space exploration, and the lessons that we can learn from that.

This page: Astronaut Claude Nicollier, mission specialist representing the European Space Agency (ESA) © NASA

Previous page: Astronaut Claude Nicollier, mission specialist from the European Space Agency (ESA), works at a storage enclosure, using one of the Hubble power tools, during the second of three STS-103 extravehicular activities (EVA). Mission: STS103-731-017. NASA 1999.

What was the training process and simulations that you completed before your first shuttle mission?

When astronaut candidates are selected, they go through a so-called basic training for about one year, where they learn about computer science, space science, spacecraft technology, and orbital mechanics. They also train in simulators of the spacecraft they will use. For me it was the Shuttle. The Shuttle was really complex. It obviously had a structure, a propulsion system, a power generation/distribution system, a system of attitude control with small rockets, and many computers. At the end of the basic training, there was a ceremony where we were nominated astronauts. Then we went through advanced training for another year to a year and a half. At that point we became eligible for assignment to a mission. When that happened, we were gathered with the selected crew—for the Shuttle it was generally seven people—the commander, pilot, and five so-called mission specialists. Mission specific training was about a year to year and a half duration. This means that we went into space at the earliest about four years after selection as an astronaut candidate within an agency, NASA, ESA, or the Russian Space Agency.

Of course, things change a lot. Sometimes people are assigned early, others are assigned late. There is not a standard pattern. For me, it was much longer than four years; it was twelve years. The reason was that my first flight was scheduled in 1986, but after the Challenger accident, it was considerably delayed. The other constraint I had was that I was the first non-American to be integrated into the NASA astronaut corps. My other two colleagues, Merbold and Ockels, stayed in Europe for the first mission. And NASA said, "Okay we can train a European to the same level as a NASA astronaut to fly on the Shuttle, but the constraint is he can only fly if there is an important European payload on board." And there were not so many. The first opportunity for me to fly was in 1991-1992. So I spent quite a lot of time in Houston!

You were a part of four Space Shuttle missions during the 1990s. Can you tell us about your process to become an astronaut?

To become an astronaut, you go through a selection. I went through the first ESA selection in 1977. At that point we were astronaut candidates, not astronauts, because you need to prove for the next year or so of basic training and advanced training that you really can become an astronaut. So you are nominated astronaut just about one year after you are selected. It is the same process for NASA. The reason why Europe started to recruit astronauts was because they were invited by the US in the late 1970s to develop a scientific laboratory for the Space Shuttle. The Shuttle was unique for being able to take something to space and bring something back from space: take people, a space probe, recover something, or repair the Hubble Space Telescope, like we did a few years later. In order to use the Space Shuttle as a real scientific laboratory, we needed some additional space and accommodation for experiments. And that was the mandate of Europe to do that. At the same time that the agreement was made between ESA and NASA to work on the Space Shuttle, NASA invited the Europeans to provide astronauts. This was the first opportunity for Europeans to become astronauts. The first selection was in 1978, with three astronaut candidates: Ulf Merbold from Germany, Wubbo Ockels from the Netherlands, and me.

That is a lot of time waiting.

In a way, it wasn't waiting, because NASA has all kinds of jobs for us. As an astronaut you are either training for space, or you are in space, or you are in the post-flight debriefing period, or you have a job, assigned by NASA. One of my first jobs was Shuttle navigation, and the experts group included an astronaut. It was an interesting job, I liked it, but it kept me really busy. I was never demotivated and just waiting for my mission. I was doing my job and learning a lot of interesting things. I knew spaceflight for me was going to come at some point.

Once you were assigned the first mission, I assume there was a really specific training required for the different aspects of the mission.

The difference in the mission training versus the basic and advanced training that I talked about was that it is specific to the mission. During the first mission, we were going to deploy a scientific platform called EURECA (European Retrievable Carrier). It was a spacecraft to be installed in orbit and then recovered about a year later by another crew on another Shuttle flight. We had to train for the specifics of the mission. EURECA had solar arrays and antennas, and they had to be deployed at a certain attitude held with the robotic arm, and the deployment had to be very precise. We also tested the so-called Tethered Satellite, a small spacecraft at the end of an electrically conducting cable, to do scientific investigations about ways to generate electricity in space without solar panels. During that year of mission specific training we mainly used the Space Shuttle simulator, but there was also classroom training or discussions with experts. Most of the time the crew would train together, playing sections of the mission, but sometimes I would train for robotics without all of my colleagues being there. In those simulations, there were failures continuously injected by our instructors, which was really good! We got spun up in dealing with the failures to such a point that during the mission we were really surprised that things went so well, unlike in the simulator where there was never more than five minutes without a problem introduced by our instructors. I remember thinking, during the mission: "Wow, we had ten minutes without a problem, so a problem is going to come soon!" *[laughs]* We took things very seriously, but we didn't take ourselves seriously in this preparation for flight. There was a good, relaxed, but very professional training environment.

How long did it take between the moment you were assigned to a mission and when you actually went to space?

About a year to a year and a half. This was typical for all Shuttle missions.

As far as simulation, you have to simulate both the tasks that you have to do and the conditions in which you have to do those tasks.

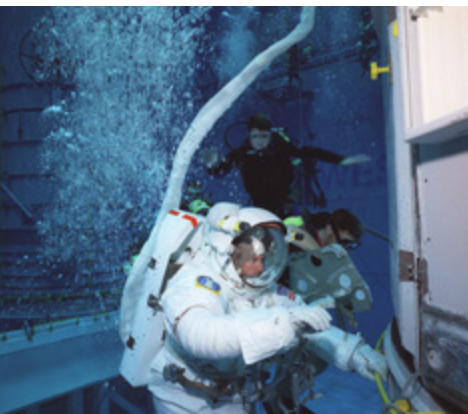
Whenever we can, yes, but we cannot easily simulate the absence of gravity. Spacewalking training is done in a water pool, as a good simulation of weightlessness, but for all of the operations inside the spacecraft—whether it is flying the spacecraft, doing robotic operations, managing the trajectory, or performing experiments—you train in a 1g environment. Zero gravity doesn't really matter in this case. As long as you are in the cabin, and you are in light clothing, the absence of gravity is not a big factor influencing the way you do things. It's only when you go out in this heavy and bulky space suit which really limits your mobility and visibility that you need to train in an environment that mimics the weightlessness of space.

When we were training in water for spacewalking, there was a model of the Hubble Telescope which was very much like the real instrument; not only one to one in size, but all the details, the circuit breakers, and the connectors were exactly the same. This is very important for an astronaut in training. It means that you train in such a high-fidelity environment that when you are in space and you meet a new instrument, like the real Hubble, you know it very well. It is exactly the same. The goal of fidelity in simulation is to reduce the surprise factor. I remember when I did my spacewalk, I came out of the airlock and moved to Hubble, and what I saw in front of me was something that I knew quite well. I rapidly became very confident and this was a very positive feeling. We had two tasks to accomplish, to replace a pointing camera and exchange the main computer on Hubble. I thought, "Claude, you can do it! You know all the details, you have seen it many times!"

What went through your mind at the moment when the airlock opened?

It's a great moment because of the stunning beauty of what you see. From inside the cabin, you see everything through thick windows. When you go out, you have this wide view, and very good optical quality of the helmet visors, and the view is spectacular! The reality is that a few centimeters away from your nose is a vacuum that is totally hostile to life. But you are protected by your suit, which is like your personal spaceship—it provides you with oxygen, it has a radio, a battery, a caution warning system, and a cooling system for your body to eliminate the body heat. It is interesting because you always hear this electric motor [woo, woo, woo, woo] that circulates the pure oxygen in the suit. This circulation is what maintains life. If the oxygen stops circulating, very rapidly you have carbon dioxide accumulating and, if that happens, you have to eliminate the carbon dioxide by opening a valve but that gets rid of the oxygen also! You don't want to do this *[laughs]*. This electric motor is like hearing your heart beat. It's the reassuring noise of life. The view is stunning while spacewalking, but you cannot focus too much on the beauty. You need to do your job, because spacewalks are always limited in time and there is much to do. The Shuttle crew and Mission Control Center personnel were monitoring our progress to be sure that we were working enough and not resting. *[laughs]* If you were five minutes behind the timeline it was not a big deal. Ten minutes, people would start to worry. Fifteen minutes, they would really start to worry more, and a half an hour was like a disaster. The pressure of having things done was quite high. I must say that sometimes I enjoyed a glimpse of planet earth for thirty seconds or so—"Wow! We are coming over Egypt, that's the Red Sea, that's the Gulf of Aqaba, and of Suez, that's Israel..." It was really beautiful, but a short time view of our planet.

Astronaut Claude Nicollier, mission specialist representing the European Space Agency (ESA), readies gear for an underwater rehearsal of STS-103 extravehicular activity (EVA). Nicollier and other astronauts assigned to space walk duty are in training for EVA chores they will handle when they make the third servicing visit to the Earth-orbiting Hubble Space Telescope (HST) since its deployment in April 1990. NASA 1999.



Astronaut C. Michael Foale, mission specialist, rehearses extravehicular activity (EVA) with the Hubble Space Telescope (HST) mockup in the Neutral Buoyancy Laboratory (NBL). SCUBA-equipped divers assist in the training. NASA 1999.



The Space Shuttle Discovery's Cargo Bay and Crew Module, and the Earth's horizon are reflected in the helmet visor of one of the space walking astronauts on STS-103. Astronauts Steven L. Smith, John M. Grunsfeld, C. Michael Foale and Claude Nicollier participated in three days of extravehicular activity on the NASA's third servicing visit to the Hubble Space Telescope (HST). NASA 1999.



"We were going around the Earth in an hour and a half, or sixteen times per day. So we had sixteen sunrises and sixteen sunsets per terrestrial day."

Photo of the Moon take from the STS-103 aboard Discovery. NASA 1999.

What happens if you were delayed?
Would they take you back to the spacecraft?

We always had reserve. Normally spacewalks were planned to take 7 hours, but we had oxygen and electrical power for 8.5 hours. We need oxygen for life, and electrical power mainly for circulating the oxygen, and for the radio. After 8.5 to 9 hours, oxygen and electrical power were essentially gone. For my second Hubble visit, we had to install one pointing camera, but we couldn't get it in because there was too much friction during the insertion into Hubble. We had done it in the pool many times, but now we had to figure out another method to get it in. In the end, we got it in but we lost an hour so our space walk lasted about 8 hours and 10 minutes. In those types of cases, you get some help, but people become nervous.

To train for the Hubble missions, you had an exact replica of the Hubble Telescope built in the swimming pool. But when you are in space, you also have to take into account the extreme contrasts between light and darkness of day and night. How does that affect the work you have to perform, and how do you simulate that?

We didn't recreate varying lighting conditions during training because we had floodlights on both sides of our helmets and we always worked with a properly illuminated worksite. We were going around the Earth in an hour and a half, or sixteen times per day. So we had sixteen sunrises and sixteen sunsets per terrestrial day. In an hour and a half, the day lasts one hour, and the night is a half an hour. We always had a one-minute warning before the sunset, because it is bright by day and within ten seconds it is night. The sun sets very rapidly, and you want to have an advance warning about this to avoid a big surprise.

Were there any specific aspects that impressed you out of your four missions?

Yes, many aspects! In my four missions there were two types of operation. The first and the third mission were scientific missions that included test of a Tethered Satellite, or a satellite on an electrically conducting leach 20 km in length. We had a major failure in the first Tethered Satellite mission, so we tried to repeat the same operation on my third flight with the failure eliminated. Seeing a small satellite at the end of such a long tether deployed vertically above us was really spectacular. The other two missions were visits to Hubble. Those were different in nature, and we didn't do any science, we were repairing an instrument. For me, the Hubble missions were spectacular. The idea of finding the Telescope in space, getting it into the payload bay, and doing major repair work on it in the space environment was really exciting. The Telescope initially suffered from a severe optical problem for three years until we repaired it in December 1993. From that point on it started to work properly and became a very productive scientific instrument.

It was very gratifying to come back from a mission in which we were able to fix a two billion dollar instrument in space. For me, as I am an astronomer, being a part of two missions to Hubble as a crew member, to fix a very valuable instrument for astronomy, was wonderful. The missions to the Hubble were special because they meant a lot for me. In a way, the satisfaction and pleasure that you derive from a mission is certainly the spectacular view, the weightlessness, and the spirit of the mission, but it also is accomplishing something that you believe in. And obviously working on the Hubble was something that was very dear to my heart. We were really serving the scientific community, and the public.



Photo courtesy of Claude Nicollier

What do you think is the value of space exploration?

Human beings are explorers. They try to go where they can; they look at what is behind the horizon. In the history of humankind, exploring has always had long-term benefits for people. Exploring the high mountains and the depth of the ocean, we learn about the Earth, we learn about ourselves, we learn about the atmosphere, and about life in the deep ocean. It is a matter of learning and discovering new things. Space exploration goes along the same lines. Only in the 1950s did we have the rockets that allowed us to go into space, although we knew the physics and the principles of space travel since Newton! Rocketry is what made space exploration possible.

There are huge benefits from space exploration: for communication, for precise navigation, and for optimizing the exploitation of the resources of planet Earth. There are also military aspects, which I won't talk about because that is not my business. When you think about GPS and equivalent systems, it is an amazing technology that we have thanks to our access to space, and a lot of smart science and engineering. Those are the practical aspects, which are all very valuable, but the other value of space is in exploration. Whenever we have the technical ability to do something, to go somewhere, we do it. We have to be careful, because it is often dangerous, but we go. It's our nature.

How do you think the presence of private funding affect space exploration? Do the goals change in any way?

I don't think the goals of space exploration have fundamentally changed. The means have changed. There is a rise of commercial space, often in partnership with institutional or government controlled space activities. This is not really a competition for NASA, because NASA wanted to support commercial companies in their efforts to access space. This will continue.

There is also a plan for a human fly-by of Mars in 2018 by a private company—the project is called “Inspiration Mars.” It should be done in a spacecraft with two people on board, with a total mission time of 501 days. It's not totally funded yet, but it is in the definition and planning stage. There is another project called “Mars One.” It is a one-way mission to Mars for four people planned for 2024. These are private ventures, and I think it is good to have private companies involved in space travel. The goals are not fundamentally different, this is exploration, sometimes to the limit, and the funding source is different.

What are the limits to continuing space exploration? Are they defined by money, politics, or strategic developments?

There is a little bit of all of that. The political component is highly important. Apollo was a spectacular achievement. There was a very strong political will by the US to beat the Soviet Union and to be the first on the Moon. The Soviet Union had the first successes in space: Sputnik 1, Gagarin, the first woman in space, Valentina Tereshkova, the first spacewalker Leonov... The US response to these early Soviet successes was very dramatic and successful. The Apollo program was primarily political, it was not scientific, and it was not commercial. But in retrospect, we learned a lot about the Moon through Apollo.

Future space exploration, like the establishment of human colonies on the Moon, will see a mix of private and institutional ventures. The Apollo Program, as you know, did cost about 20 billion, and the space station about 100 billion, and the cost for a NASA led human mission to Mars is going to be tens of billions of dollars. It would be difficult to raise money privately to do that. At the same time, there is a rise of companies

that are planning to do bold things in space exploration. There is more freedom in private ventures. NASA probably can't send a crew one-way to Mars on public money. But a private company can do that. I think it is interesting because the rise of commercial companies and projects gives a new dimension to space exploration. Private companies can do “crazy” things, and can do them relatively fast. On the other hand, NASA does things more slowly, establishing solid roots, having safety margins that are quite high, with a high likelihood of success but generally high costs. It is interesting to see these two approaches of space exploration run in parallel.

Which boundaries would you like to see broken?

I'd like to have real colonies on other celestial bodies. What I mean by real colonies is colonies with babies. And what I mean by babies is people who live there, who reproduce there, and live long-term there. Because, as long as we bring adult people and they come back (or they don't), that is not a real colony. Even in the project of Mars One, there would be four people who would die there. Before they die, there would be four others that would be brought a few years later. It could look like a colony, but would be bringing people, over and over, and they would die there, after hopefully running happy and productive lives. The day we can have people on the surface of another celestial body, who really can live there long-term, including having hospitals and babies, with good life quality, this will be an enormous breakthrough.



Astronauts C. Michael Foale and Claude Nicollier (on Discovery's robotic arm) install a Fine Guidance Sensor (FGS) into a protective enclosure in the Shuttle's payload bay. NASA 1999.

What on Earth have you experienced that rivals what you experienced in space?

For me, one of the things that struck me in my space travels was the unbelievable beauty of what I saw. I have not seen anything here on earth that would come close to that. It was to the point of crying, or pinching myself. I said, "Claude, are you dreaming, or is this really happening?" The view down and up from space is unbelievably beautiful. I remember looking at the sky and the constellations moving sixteen times faster than you see the constellations moving in the sky from planet Earth—amazing! For somebody who has affection for starry nights, to see the whole sky in a half an hour—the spring, summer, fall, and winter constellations—was unbelievably beautiful. I have not had the experience before my flights or after my flights of anything so beautiful here on Earth.

Let's talk about the Solar Impulse, where you are currently the Head of Flight Test. How is that project comparable to your experience in preparing as an astronaut, and what are the challenges you are facing?

In addition to astronomy—I was a professional astronomer for a few years before I became an astronaut—I have always been a pilot. I was a pilot in the Air Force of Switzerland, and I went to Test Pilot School in England after the Challenger accident. I was much later proposed the position of Lead Flight Test for Solar Impulse. It's interesting because the Solar Impulse airplane, very slow and using the sun's radiation as the only source of power for propulsion, is exactly at the other end of the Space Shuttle in the spectrum of flying machines. The Space Shuttle is the fastest winged machine to ever fly, up to 26 times the speed of sound, and the Solar Impulse is one of the slowest, with 23 knots of cruise speed.

In 2004, I was approached by the founders of the project Solar Impulse, André Borschberg and Bertrand Piccard, to be involved

in the flight test of this airplane. I know André Borschberg quite well because I flew Hawker Hunter fighter bombers in the Military. I immediately said yes because, for me, it was a new and really interesting dimension in aviation. To use the sun as the only source of power for propulsion of a piloted airplane was very ambitious, but it worked! To use solar energy, distributed over a 24-hour period, means that you collect during the day what you need for the night, in batteries. The goal of the project is to go around the world in 2015 without using propellant. The ecological message is to exclusively use a renewable source of energy to go around the world. I totally subscribe to this goal, although my focus is more on the aeronautical aspect of the project. Solar Impulse will go around the world in several steps. It doesn't have the performance to take more than one pilot, so it would be impossible to take two months to go around the world in a very slow piloted solar airplane.

The prototype of Solar Impulse had a number of problems. For example, we had to correct the geometry of the airplane to make it stable. For me, it was an honor and a privilege to be a part of that process, and technically really interesting. It is such a new kind of airplane that we have to be very careful, and approach each of the flight testing steps with caution. We did low-speed taxi tests and high-speed taxi tests. We went on the runway just with the velocity to get airborne and then landed immediately afterwards. We only took small steps in testing, to be sure that we were not going to break anything, nor injure anyone. And it worked fine. We will adopt the same philosophy with flight-testing the final airplane, which will go around the world in 2015. Flight-testing will start around this May 2014 and will last until July.

So the new model of the plane will be ready in May?

Yes, we will start with the taxi tests at the end of April or beginning of May. The airplane has been designed and built near Zürich. It is being disassembled now, and brought to the Payerne Air Force Base, in a countryside area north of Lausanne, Switzerland to perform all of the flight-tests. The airplane will begin its flight around the world in early 2015, from a location that is still to be determined.



Astronauts C. Michael Foale (left) and Claude Nicollier (right) participate in the second of three STS-103 spacewalks to service the Hubble Space Telescope (HST). NASA 1999.

READY-MADE #1, 2014 BY AVATART.

A Clearing in the Woods:

Bearing witness to change through repetition

When our lives get to the point where days, weeks, months, and even years blur into one another, it becomes more difficult to drive a stick into the earth and resist the ever-rushing current of time.

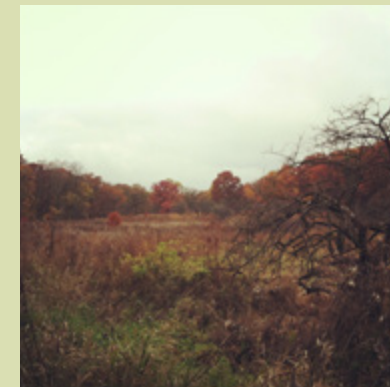
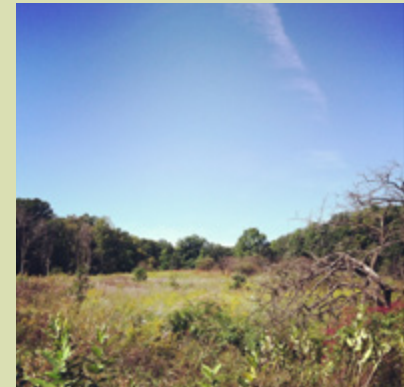
The repetition of our daily routines masks change.

We become unaware of the subtle changes going on around and within us, until one day we finally see evidence and it shakes us to the core. Be it the grayness in our hair, the cold winter air on our cheeks, the weakness in our arms, or the unacknowledged passing of anniversaries.

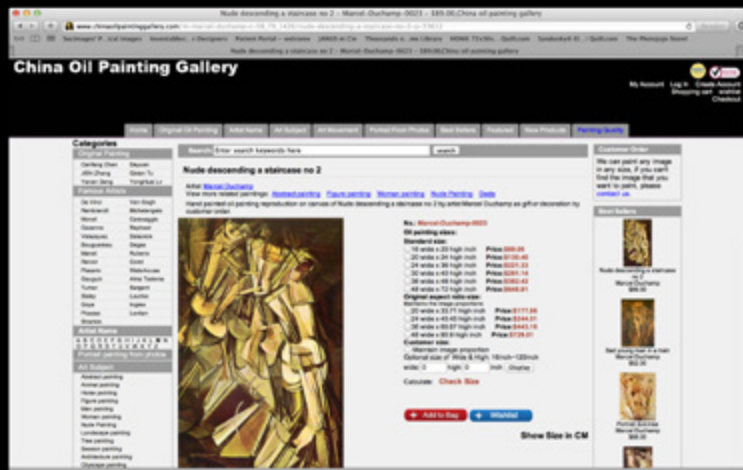
The sudden act of noticing change can be an unfriendly reminder of the breakneck pace of our daily rhythms.

But what if we offered ourselves the gift of intentional repetition with the pure goal of witnessing change? What if an aspect of our routine was the planting of a stick in the ground and rooting ourselves in a moment of witness? Or to see the geese flying south overhead or the slow coloring and eventual fall of leaves?

Last autumn, I offered myself this intentional pause every Saturday morning at a clearing in the woods. These photos on the following page are evidence of my quest to bear witness to change through repetition.



NOTICED BY RICK VALICENTI



READY-MADE #2, 2014 BY AVATART.

Designers

263

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Lauren Ayers
Jeremiah Chiu
Renata Graw
Jinhwan Kim
Jennifer Mahanay
Dan Marsden
Jason Pickleman
Scott Reinhard
Michael Renaud
Bud Rodecker
Isaac Tobin
Rick Valicenti
Katherine Walker
Beth Weaver
Magdalena Wistuba



MAS CONTEXT / 21 / REPETITION

[Nick Adam](#) is proudly practicing strategy and design at Chicago's Firebelly Design. Some of the recent project he's been involved with are the naming and identity of Divvy, the Typeforce-3 book, the Rebuilding Exchange brand-overhaul, the IIT Institute of Design website redesign, as well the PechaKucha website redesign. He is a card holding member of Moving Design, Society of Typographic Artists, Three Hearts Club, and You Are Beautiful.

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[Jason Pickleman](#), [Dan Marsden](#), and [Leslie Bodenstein](#) run the JNL graphic design in Chicago. Since 1992 the studio has produced design that looks like art, and art that looks like design. Boundaries don't interest them. Ambiguity does. Appropriateness, however, never hurts.

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Plural is a Chicago-based creative studio practice founded in 2008. With a focus on pursuing meaningful projects, Plural explores new approaches within the design process, experimenting in a wide range of media including print, web, video, sound, interactive, and installation.

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[Kyle Poff](#), originally from Lubbock Texas, currently lives and works in Chicago at Leo Burnett Department of Design. He is also the founding partner of Monument Partners with Casey Martin.

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Before starting SRCo., [Scott Reinhard](#) worked as a Senior Designer at the Museum of Contemporary Art Chicago where he was part of a bustling and prolific design and publishing department run by British/Australian graphic designer James Goggin. Prior to the MCA, Scott was a Senior Designer at Chicago-based branding firm VSA Partners, Inc., working with Converse, IBM, First Data, and Motorola, among others.

Scott is a graduate of the Savannah College of Art and Design in Savannah, Georgia. While in school he spent a time being an intern at Segura, Inc. and Open.

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[Michael Renaud](#) is a Chicago-based designer and the Creative Director for Pitchfork, the world's most widely respected guide to music. He leads a team that visualizes the website on a day-to-day basis, in addition to their two festivals in Paris and Chicago, their recently launched venture into film *The Dissolve*, and the quarterly print publication *The Pitchfork Review*. The design of such endeavors has led to many Webby awards, the 2013 National Magazine Award for digital excellence, and a spot for Michael on Ad Age's Creativity 50 list.

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[Bud Rodecker](#) is a principal designer at 3st and an adjunct professor at DePaul University. His work explores the space between logical constraints and formal play, and balances form with meaning. He is interested in systems and processes with the potential to create design.

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[Katherine Walker](#) is a Senior Designer at VSA Partners and has had her work recognized in AIGA 365, STA Archive, Dwell, UnderConsideration, and Communication Arts, among others. She is a pragmatic idealist, as committed to her principles as she is to putting them into action. She sits on the board of AIGA Chicago as Community Outreach Chair and is the Director of AIGA's Mentor Program. Katherine co-founded Quite Strong—an all-female design collaborative focusing on community-oriented events and empowering creatives. She is an adjunct professor at DePaul University and a graduate of the School of the Art Institute in Chicago.

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[Magdalena Wistuba](#) is a designer and artist interested in public language use. She was born in Santiago, Chile and studied cognitive sciences in Houston, Texas prior to moving to Chicago in 2011. She is currently working towards a graduate degree in visual communication design at the School of the Art Institute of Chicago.

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Bianca Bosker is an award-winning journalist and the author of *Original Copies: Architectural Mimicry in Contemporary China* (University Of Hawai'i Press, 2013). She is currently the Executive Tech Editor of The Huffington Post where, in 2009, she co-launched the tech section. As a columnist and feature-writer focusing on social media, artificial intelligence and the intersection of tech and culture, she has explored technology's role in creating a faking-it-big world where people fall in love with video games, and Twitter celebrities turn out to be mere chatbots. Bosker is also the co-author of *Bowled Over: A Roll Down Memory Lane* (Chronicle Books, 2002).
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Edward Burtynsky is known as one of Canada's most respected photographers. His imagery explores the intricate link between industry and nature, combining the raw elements of mining, quarrying, manufacturing, shipping, oil production and recycling into eloquent, highly expressive visions that find beauty and humanity in the most unlikely of places. His remarkable photographic depictions of global industrial landscapes are included in the collections of over fifty major museums around the world.
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Livia Corona Benjamin is a photographer whose work explores the social and political implications of architecture. Her photographs and texts comment on how these affect and modify human relations. She is a 2009 Guggenheim Fellow and a current recipient of an SNCA Endowment for the Arts, granted by Mexico's Commissions of Arts and Culture, as well as a 2013 Pictet Prix Nominee. She is the author of two monographs, *Enanitos Toreros* (2008) and *Of People and Houses* (2009), and is preparing a third book on her acclaimed *Two Million Homes for Mexico* series.
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Panos Dragonas is an architect and associate professor of architecture and urban design at the University of Patras. He is the co-founder of dragonas christopoulou architects in Athens and the joint commissioner and curator of "Made in Athens" that represented Greece at the 2012 Venice Biennale.

His design and theoretical work focuses on the ambiguities between public and private space, urban and natural landscape, local and global culture.
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Fake Industries Architectural Agonism, formed by Cristina Goberna and Urtzi Grau, is an architectural office of diffuse boundaries and questionable taste that explores the power of replicas, in the double sense denoted in romance languages—both as literal copies of existing works, and as agonistic responses to previous statements—for the advancement of the field. Goberna and Grau currently teach at Columbia University (GSAPP), Cooper Union, and the Princeton University School of Architecture.
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José García Soriano is a young Spanish architect who studied at the Polytechnic University of Valencia, Spain. Interested in heritage and rural areas, he has studied abroad and worked as an intern in Granada, Hanover, and Santiago de Chile. He is currently completing a master's degree on Building Energy Renovation at the Polytechnic University of Madrid.
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Iker Gil is an architect, urban designer, and director of MAS Studio. In addition, he is the editor in chief of MAS Context and the co-director of the Chicago Expander program at Archeworks. He is the recipient of the 2010 Emerging Visions Award from the Chicago Architectural Club.
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Claude Nicollier is a retired ESA astronaut who has flown on four Space Shuttle missions between 1992 and 1999, including two visits to the Hubble Space Telescope. His career as a pilot includes 38 years as Swiss Air Force pilot, three years as Swissair pilot, test pilot's school completed in 1988, and private piloting on several aircraft types. He is the head of flight test operation at Solar Impulse and teaches a course on space mission design at EPFL and ETHZ.
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Project_ is a design and research firm founded in 1998 by Ana Miljački and Lee Moreau. Through the production of buildings, exhibitions, writing, and the instigation of discourse, Project_ strives to critically re-wire histories and futures of architecture. Ana Miljački is currently an assistant professor of architecture at MIT and a co-curator with Eva Franch i Gilabert and Ashley Schafer of the US Pavilion for the 2014 Venice Biennale. Lee Moreau is a registered architect and a principal in the design and innovation firm Continuum.
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The Cover

The image on the cover references reproduction on different levels: As an object—it's a woodblock used for the letterpress reproduction of the Xerox logo. As a concept—Xerox has become synonymous with reproduction; their copy machines are so prevalent that the name xerox has moved from a noun to a verb.

This is the first in a series of collaborations between Thirst and Ross Floyd.

Every reasonable attempt has been made to identify owners of copyright. Errors or omission will be corrected in subsequent editions.



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GRAHAM FOUNDATION**WRIGHT**

Next

MAS Context

Issue 22 / Summer '14

Surveillance

Our next issue will focus on the topic of SURVEILLANCE.

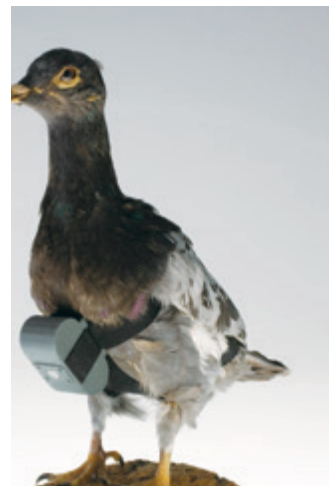
This issue will examine the role and presence of surveillance in our built environment. It will explore the topic from multiple angles, from monitoring, archiving, and using the traces that we leave, to camouflage techniques and deletion to remove those traces. This issue will seek to generate a constructive conversation about the history, policies, and applications of the information that we generate and how those aspects are manifested in our daily lives.


22 | Surveillance Summer '14

will be published in early June 2014.

Pigeon Camera

CIA's Office of Research and Development developed a camera small and light enough to be carried by a pigeon. It would be released, and on its return home the bird would fly over a target. Being a common species, its role as an intelligence collection platform was concealed in the activities of thousands of other birds. Pigeon imagery was taken within hundreds of feet of the target so it was much more detailed than other collection platforms.





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