Home-city interactions in suburban Tokyo: Moriyama House by Ryue Nishizawa*

ABSTRACT
In 2002, Ryue Nishizawa received the commission to build a house in the special ward of Óta, a traditional village swallowed by the expanding metropolis. The proposed scheme colonizes the plot with independent boxes and interlocking gardens, allowing the owner to rent part of the property while paying his mortgage. This design strategy, based on a radical fragmentation of the dwelling program and on the blurring of hierarchies, is closely linked to Tokyo’s urban context, firstly in socio-economic terms. It also confers a renewed role to the existing network of urban voids from the neighborhood; it invites a reconsideration of the idea of limit and it challenges traditional spatial binaries like exterior/interior or public/private. Ultimately, this paper aims to show how Moriyama House acts as an active component of the ever-changing city fabric around it, while questioning traditional bonds between home and city in the framework of contemporary culture.

INTRODUCTION: A PARTICULAR SET OF URBAN CONDITIONS
I once heard it said that the way urban dwellings are built in Tokyo somewhat resembles its people standing on a crowded train. In other words, the arranged juxtaposition of urban dwellings is similar to the manner in which the passenger orient their views and create distance between one another. (Sakamoto, 2007)

This metaphor is useful to introduce the double perplexity that Western observers usually feel when looking at Tokyo’s urban structure for the first time. On the one hand, the fragmentation of private property into very small lots produces an extremely crowded, chaotic image of disparate constructions. Just like each train passenger displays a singular appearance and acts in a selfish manner to find a most comfortable position within the crowd, Tokyo’s urban collage accumulates selfish buildings next to each other, most of them ignoring what happens at the other side of their limits. On the other hand, the foreign eye is irremediably caught by how these variegated structures are always separated by very narrow alleys or minimal gaps.

A civil law in Tokyo actually requires the exterior wall of all buildings to be set back 50 centimeters from the edge of the lot in order to prevent fire and earthquake propagations. This urban regulation has created a particular “fragmented urban landscape”, where very high densities coexist with an equally high porous condition. In the last decade, Tokyo’s vacant interspaces have received a great attention by practitioners and academic circles all over Japan. As a case in point, the Yokohama National University developed in 2005 a research project called “Urban Void Program” by a group of designers, teachers and students that included Ryue Nishizawa himself. The goal of this research was to explore the theoretical and design potential behind the concept of urban porosity, calling for the reactivation of Tokyo’s traditional dialogues between seemingly opposite realms such as interior/exterior, private/public, natural/artificial or architectural/urban.

Three years before the completion of this research project, Nishizawa received the commission to build Moriyama House in the southern outskirts of Tokyo. Originally an arable land, this suburban area of the old capital was long ago swallowed by successive waves of urbanization, increasingly subdivided into smaller properties. Today, the neighborhood displays a crowded accumulation of wooden structures of more or less similar dimensions, either individual houses or low-rise multistory
buildings. These constructions are all separated by an irregular system of vacant interspaces; in the words of Nishizawa: “roads crisscross in a vaguely haphazard way to produce a strange pattern, neither entirely random nor grid-like.” (Nishizawa, 2010) Another peculiar characteristic of the area is that the resulting network of voids is often colonized by neighbors as if it were a natural part of their own property; that is, as a natural expansion of their homes, which has yet to respect other neighbors’ spontaneous expansions. A series of field sketches drawn by Nishizawa in his first visits to the site pay special attention to this issue, showing the unpaved gravel alleys and narrow cul-de-sacs full of plants that pervade the place (Figure 1).

With this context in mind, it is easy to understand why Nishizawa chose a radically fragmented scheme for Mr. Moriyama’s private house (Figure 2). Intuitively, he might have sensed that the act of scattering volumes across the site could establish a deeper structuring link with the inner order of the surrounding urban fabric. Moreover, at first glance, this “dismantling strategy” – as he himself calls it (Nishizawa, 2010) – may have seemed more viable than other solutions to host the spontaneous occupation of interstitial spaces that pervaded the area. Just like many other Asian architects, Nishizawa has never hidden his pride about the singularities of Eastern urbanism in contrast with Western cities. Frequently, he has highlighted the attractive vibrancy behind the ever-changing nature of Japanese urban realities, along with their strong mixture of artificial and natural realms (Nishizawa & Tsukamoto, 2007). Nevertheless, he has also warned about a recent tendency that is making Japanese buildings more and more introverted, closed-off from streets, nature, neighbors and the city itself.

The following analysis looks into Nishizawa’s efforts to reverse such a tendency, from the standpoint that neither a mere reproduction of the urban surroundings nor a total alienation from the spirit of the place was sought by the architect. Significantly, Moriyama House is able to establish a powerful ambiguous tension between integration and independence towards its context; a tension that ultimately, seeks to construct new significant bonds between home and city in an overwhelming expanding metropolis like Tokyo.

ACKNOWLEDGMENT OF SOCIO-ECONOMIC PROCESSES: A TIME-BASED PROPOSAL

As a result of investment pressure, the private properties in the residential area of Ōta, where Moriyama House stands, have been successively subdivided by incoming generations. Unable to pay the increasingly high inheritance taxes, people have been forced to break into pieces their family’s properties and sell these fragments to other families or investors. Yoshihary Tsukamoto, founder of Atelier Bow-Wow, has used the term “subdivurban” to refer to this particular phenomenon (Figure 3), responsible for the shrinkage of lots in the area to approximately one third the original size over the last 90 years (Tsukamoto, 2010).

1 In his own words: “Nowadays, people have an increasingly enclosed life in their houses, only facing the interior, and they don’t want to have windows, they don’t want to go outside, and nobody goes walking along the street” (Cortés, Nishizawa, & Sejima, 2008).
As Akira Suzuki has suggested (2006), Nishizawa might have replicated this “subdivurban” process at a comically accelerated pace. Indeed, if Mr. Moriyama’s inheritors needed to sell part of their lot at some point, this could be made without having to tear down their built property. In other words, a large number of possible subdivisions would be already embedded in the inherited volumes. And even if one part of the site had to be demolished and other houses built instead, the hypothetically reduced Moriyama version would still preserve a natural link to the evolving city fabric (Figure 4).

Recalling Stan Allen’s definition of “field conditions” (1997), it can be asserted that the overall form of Moriyama House is highly fluid, definitely less important than the internal relationship of parts. This means that a change of outline or extension in this little house should always keep its inner coherence. In this sense, the system of small white boxes, despite its intimate structural dependency on its surroundings, can also be read as a quite independent organism within the generic city in which it is inserted. Reading the only two legal constants of the area (the compulsory gap between constructions and the natural tendency to property fragmentation in time) as the main configurative principles of the city, the project is able to establish a strong long-term relation with it.

Somehow, the 1960s optimism over the potential expansion of modular design systems—“units can be added without changing the basic structure” as Fumihiko Maki proudly asserted about the “group form” (1964)—is transformed at Moriyama House into an opposite yet equivalent interest towards uncertain shrinkage. Due to its modular condition, this project could potentially allow expansion or diminishment in an indistinct manner, preserving its identity in time, until maybe… vanishing discretely from Tokyo’s mutable fabric. Just like a “living organism” finds the key for biological independence in its dynamic interaction with external uncertainty, Nishizawa might have found a clever leeway to react against the uncertainties of urban evolution in the long term; a leeway to confront, both in theoretical and practical terms, the inexorable tendency towards change that many see as the only certainty in the future of Asian cities.

Furthermore, apart from taking into consideration long cycles in the life of the city, Moriyama’s spatial scheme also acknowledges the power of time as a design catalyst in the medium and short term. In this sense, the different volumes that generate the house permit the domain of the residence to change in parallel to the evolution of the inhabitants’ own life. The initial idea was that the client could pay his mortgage by renting part of his
and the only liable constant that the architect

time-based design strategy that accepts change

can also be read as a
dynamic lifestyle that should not be taken for

Neither, transcending this superficial

property, being able to occupy further volumes

Having arrived to this point, he would be free to

habitants to pay his mortgage. Drawing by the authors,

expected tendency in Mr. Moriyama’s need to have
tenants to pay his mortgage. Drawing by the authors,

BEYOND FORMAL ANALOGIES: A RENEWED

I realized Moriyama House […] was not

BEYOND FORMAL ANALOGIES: A RENEWED

In several publications, Moriyama House has

works with, and moreover, as a strong evocation

of the constant transformations taking place in
cities at a larger scale.

property, being able to occupy further volumes

in the future, until absorbing the whole plot.

Having arrived to this point, he would be free to

shift his bed’s location from winter to summer,

on interest that forced you to carefully look

at the surroundings and react, but something in

between. Not completely indifferent or

completely interested, but something in

between that switches between the two.

(Cortés et al., 2008)

In several publications, Moriyama House has

been described as a sort of scaled reproduction

of its urban surroundings, just as it is often

assumed that the gaps between its built modules

were created in the image and likeness of

the neighborhood’s existing voids, as a sort of

mimetic piece of Ota’s existing city fabric.

These statements are not surprising, because

at first glance, Nishizawa’s proposal can only

be fully understood when inserted in the

particular context described above. As noted

by Yoshiharu Tsukamoto, Moriyama House is
definitely “more suitable surrounded by the

wood-and-mortar houses and apartments than

by a group of isolated islands or trees in a

forest” (Nishizawa & Tsukamoto, 2007). This

contextual integration is moreover emphasized

by the architect’s strategic representations of the

surroundings as a simplified pattern of lines that

only distinguishes between built and void. Thanks
to these intentionally partial drawings, each box

within Moriyama’s ensemble is conceptually

put at the same level than the rest of the

constructions; even the bathtub module can

autonomously compete with them. Although all

of Moriyama’s boxes are significantly smaller that

the neighboring volumes, this scalar reduction

is naturally integrated into the general figure/ground

algorithm of the area. And to a certain extent,
even when looking at an aerial image

where formal details and materiality enter the

scene, Moriyama’s fragmented reality still goes

rather unnoticed among its neighbors.

Nevertheless, transcending this superficial

analogie, it becomes evident that the size, shape

and proportions of Moriyama’s voids are hardly

found in the real city. While the neighborhood

is full of long, narrow passages, dark alleys and
cul-de-sacs at most occupied by linear greenery,

Moriyama’s serial game is carefully studied

in order to guarantee the gardens’ human

dimensions in both plan and section. With luck,

the uncoordinated constructions in the area offer

sequences of two or three interlocking voids with

good proportions for family reunions or children

games. Conversely, Moriyama’s concatenation of

exterior spaces deliberately overcomes what the

existing urban context provides. The transgression

of its spatial scheme lies precisely in conflating

the scale of a large garden with corners to hide

and a miniature village with plazas to share.

Since none of them can be fully extracted from

the existent city and yet partial suggestions of

both can be found in it, Nishizawa’s proposal for

an “atomized house” can be said to constitute

a totally different reality from the surrounding

neighborhood but at the same time, be strikingly

similar to it (Figure 6).

In this line, Japanese architect Toshihiro Oki

has asserted about his first visit to the site that

once familiar with the project, the surrounding

neighborhood began to be of curiosity just

as much as the house itself, leading to the

acknowledgment of very specific urban features

(Sejima, Allen, Idemburg, & Oki, 2010).

Ultimately, Oki’s statement suggests that the

intimate link of this house with the city fabric is

displayed in such a plain manner that the visitor

is invited to look around at the relationship

between built and void as he never did before.

Paying the same attention to both elements in

that pair, Nishizawa’s design strategy actually

recalls the delicate interplay between silence

dialogue experimented by the director

Yasujirō Ozu in films like Tokio Story (1953).

Consequently, the spontaneous appropriation of

in-between spaces by the neighbors of Ota is

only praised by visitors once Moriyama House
has made obvious its value. In other words, after admiring the carefully-shaped voids of this little house, full of delicate objects and plants, and in perfect balance with their corresponding system of built volumes, the visitor begins to feel further stimulated by the 50 centimeter-wide contour of properties in the area, un-built stripes hitherto identified as residual voids but now “aesthetically reborn”.

POROUS BOUNDARY: THE POTENTIAL OF PSYCHOLOGICAL LIMITS

In Japanese cities, the territorial extension of communal events at tsuji, in street markets, (…) is never fixed but is instead temporary and amorphous, even if there are markers and a shared understanding regarding them. Such ambiguous demarcation is called kaiwai. It is impossible to mark the spots clearly on the map: they are just vague areas. That is to say, Japanese cities did not have plazas –but rather kaiwai. (Isozaki, 2006, p. 66)

The analysis of bonds between Moriyama’s architectural order and its surrounding context turns now to the delicate question of demarcating its external limit; that is, to the act of defining a border between what is still part of the project and what stops belonging to it. Design mechanisms based on a serial order have the intrinsic vocation of expanding ad infinitum. However, in order to become real architecture, they must finish at some point; and therefore this ending’s definition has always been a critical dilemma for architects.

One way of dealing with iterative systems’ irremediable limit implies its actual physical disappearance, gradually dissolving the “unfinishable” project into the surrounding reality. To this regard, Arata Isozaki’s previous consideration on the kaiwai helps to contextualize Nishizawa’s familiarity with a possible “absence of borders” within the Japanese built environment. However, the question remains: how to materialize such disappearance of limits while preserving a recognizable passage between two different realities?

At Moriyama House, this question is particularly delicate, since the boundaries of the project mark the passage from the urban to the domestic realm, that is, from the most public to the most intimate human territory. Accepting the necessary separation between the two worlds, Nishizawa still recognizes the “absence of borders” as a main concern triggering his design. Accordingly, with no physical fence wrapping around the built modules, the realm of the streets seems to be naturally incorporated into the domestic territory. Furthermore, the change of pavement that surrounds the lot is unable to “enclose” the overflowing voids, which tend to pour out of the site’s legal limits, ignoring this subtle mark on the ground.

In the book Tokyo Metabolizing, Nishizawa identifies seven architectural issues underlying the design of Moriyama House. After explaining the concept of “dismantling”, he sets forward the notion of “a-centricity”, according to which the resident, even when standing at the edge of the plot, feels encompassed by the surrounding environment as if he was located in its geometrical center (Nishizawa, 2010). This means that in order to guarantee a sense of “a-centricity” in perimeter points, the pre-existent volumes at the other side of Moriyama’s legal border are incorporated as active elements in the creation of the new architectural landscape. From an inner position, the surrounding constructions are thus not perceived as an offensive contamination to be hidden from the sight, neither assumed as a neutral backdrop.
Even if materially and geometrically different, they are promoted instead as an integrated extension of Moriyama’s atomized reality, as a set of successive perceptive layers.

Meanwhile, from the position of a passer-by in the street, things become quite different. It is necessary to question now another recurring commonplace around this project: its usual description as a provocative conflation of public and private realms, which potentially incorporates the alleys between boxes to the network of public roads in the area. It is true that Nishizawa often declares that this commission made him think about “a space that couldn’t be contained within an officially delineated area” (Nishizawa & Kitayama, 2010). However, even with no physical fence around the site, the property is clearly demarcated and the project’s “end” becomes an imposing psychological limit between two clearly different territories. Right on the edge, even a small child looking towards the public road realizes that he is getting out of Nishizawa’s game board (Figure 7). From the outside, a myriad of flowerpots and half-hidden personal objects immediately dissuade any temptation of trespassing this virtual fence.

In sum, Moriyama’s alleys and gardens are definitely not public. Nishizawa’s interstices are only open to residents, allowed visitors and trusted neighbors. The urban presence of the building(s) from the outside is quickly understood as a different reality, even if remaining open to the street. Moreover, even if deep visual corridors cross the site in various directions, the alignment of boxes to the rectangular geometry of the contour (always respecting the 50 centimeter unbuildable strip) serves as a visual protector from intruding sights for the main interior gardens. Likewise, the strategic position of windows avoids exposing the most private activities to strangers’ eyes. Trusting the power of ambiguity, Nishizawa’s composition of scattered boxes is somehow able to both diffuse and clearly delimit Mr. Moriyama’s territory, paying special attention to the psychological experience of space.

FUNCTIONAL DISRUPTIONS (1): BETWEEN INTIMACY AND INTERACTION

One of the most striking details about Moriyama House’s functionality is the impossibility to define a main entrance for the house – or better said, houses. The equivalent treatment of the four limits of the rectangular lot denies any privileged orientation, aligning volumes in a similar manner to both front streets and back alleys. To access any of the units, the user has to plunge into the interstitial “magmatic” garden space, no matter from what point he entered. Once there, it is possible to move in all directions; nothing indicates the “correct” path towards the main door – mainly because this door does not exist. In fact, only a couple of modules present a tiny canopy signaling their entrance; the rest crossable openings are deliberately confused with windows. It could be said that the exterior space functions as a multidirectional corridor for a very special set of rooms, as if the typical structure of a renaissance palace – described by Robin Evans (1978) as a matrix of interconnected rooms– had been broken down and dispersed, providing the units with more independence without having to resort to the modern scheme of linear corridors (Figure 8).

Moriyama’s collective circulation gets therefore diluted into the interstitial space between boxes, fading away functional easements, challenging conventional concepts of communal living and proposing a profound reconsideration of the balance between intimacy and social interaction in contemporary urban communities. Furthermore, Moriyama’s non-hierarchical scheme is voluntarily associated with freedom of movement – and therefore, of use – based on the conviction that having multiple entrances and no fixed circulation routes “residents are free to choreograph their own experience” (Rob, 2007).

Nishizawa often repeats that one of his triggering ideas for the project was that each module would have its own garden. However, despite an equilibrated built/void algorithm, it is not so clear whose garden is each. This ambiguous sense of property within the lot, only nuanced by the position of trees and each tenant’s personal belongings, tend to foster a mutual regard between inhabitants, forced to respect each other’s privacy without any physical borders between them. Besides some especially protected areas that allow residents to disconnect from the others, Nishizawa’s spatial scheme seems to naturally incite people to gather in groups, either inside the so-called “meditation room”, a 20m² surface around a dining table between two boxes, or on the communal rooftop terrace – a very special set of rooms, as if the typical structure of a renaissance palace – described by Robin Evans (1978) as a matrix of interconnected rooms– had been broken down and dispersed, providing the units with more independence without having to resort to the modern scheme of linear corridors (Figure 8).

7. Even a kid realizes about the “psychological” limit of Moriyama House. Collage by the authors based on a photograph by Edmund Sumner. Courtesy of the photographer.

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2 As proved by a photograph of a child sticking his head out of this virtual line, published in Architectural Review (Rob, 2007).
give thought to each other’s movements. (…) And the existence of this type of relationship produces a space in which people are made aware of the fact that they are part of a community” (Kitayama, 2010).

In sum, although Nishizawa asserts that in the beginning of the design process his main concern was not so much “conviviality” but “diversity”, the communal effect of the project cannot be denied. Either deriving in awkward tension among tenants or in pleasant sociability, this spatial experiment must be praised as a daring venture into the “perils” of contemporary dwelling; a venture that begins by calling into question the conventional sequence public–collective–private, and that continues by disrupting other traditional spatial categories, such as circulating versus staying or indoor versus outdoor distinctions. These themes connect as well to further debates over the relation between “interior” and “interiority”, or in Richard Sennett’s words, “between the enclosure of physical space and the notion of subjectivity” (Sennett, 2016).

**FUNCTIONAL DISRUPTIONS (2): INTERIOR-EXTERIOR INTERFERENCES**

At Moriyama House, an especially powerful tension is established between indoor and outdoor space. Somewhat, despite their antithetical nature and their clear physical delimitation, interior and exterior space dream of being confounded and even exchangeable, evoking an old tradition in Japanese cities that Nishizawa often recalls: “Tokyo was born as a village with fields, coexistence between nature and village. No boundary between inside and outside. There is a border, but not like in the Western city” (Cortés et al., 2008, p. 11). Indoor and outdoor dwelling become inseparable and equally important for the unconventional lifestyle proposed by Nishizawa; a strong statement that is supported by both a series of design decisions and by the eventual occupation of the resulting space by the client.

In the first place, Moriyama’s careful atomization maintains a dimensional similarity between the above-mentioned spatial dualities; even if they are forced to be used as circulation, most of the intermediate gardens are wide enough to be considered more a room to linger than a corridor to cross. In addition, the architect makes the boxes’ ceilings higher and the windows as big as possible, hoping that the interior and exterior would have a similar amount of light and therefore their separation will fade. The extremely thin membrane that mediates between both worlds is deliberately presented as an ambivalent entity: like most physical divisions in SANAA’s work, this is a clear-cut surface –geometrically precise and mainly opaque despite the large windows– but at the same time, it pretends to be more an osmotic connector than a frontier (Figure 9).

Besides sharing similar dimensions and light, the outside is further expected to house equally important domestic activities than the inside. Accordingly, both realms are drawn in the floor-plans full of the same myriad of scattered freestanding objects (chairs, tables, teacups, books, clothes, flowerpots, etc.) that tend to supply the architectural materiality that the pristine white backdrop lacks. In this sense, the penetration of nature and other typically outdoor elements into interior spaces is balanced by an equal leakage of “artificial” objects and interior furniture into the theoretically natural context. Taking Nishizawa’s floor-plans and making the walls disappear, it would be hard to reconstruct again the exact position of the modules: the sprinkling of furniture and plants all over the plot gives no clue about their interior or exterior origin (Figure 10). Not only both realms are designed with the same level of attention and detail, but moreover, the objects once drawn on plans seem to have magically colonized the real space. Maybe this is just a perfectly studied marketing strategy, agreed between architect and official photographers, but perhaps it has also much to do with the client’s assumption of indoor

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3 In the words of Nishizawa: “So first, I think I didn’t think so much of a community or of the conviviality that this design would have implied. I was thinking of the idea of diversity. Now the combination of the form, the program and the way the community uses the house brings back to me the feeling of Tokyo” (Nishizawa, Taylor, & Borasi, 2008).

4 As noted by Nishizawa: “Large wholes were made in each of the structures. In this way, the interior and exterior have a similar amount of light” (Nishizawa, 2010).
and outdoor dwelling as two sides of the same coin, and with his acceptance of such disruption of binaries as a key requisite to maintain the originality of his home and its unique attunement with the surrounding city.

CONCLUSIONS

The project for Moriyama House reveals how a specific urban condition can serve as a key catalyst for the conception of a sophisticated housing program. The particular genius loci of this suburban area of Tokyo certainly inspired the morphological characteristics of the project. However, there are further issues that also played a significant role in the design process, promoting critical crossings between architecture and other knowledge fields such as urban history, economy, sociology or psychology.

This article has disclosed, in the first place, a series of meaningful relationships between the project’s spatial scheme and a specific socio-economic phenomenon shaping the evolution of this area of Tokyo in the last hundred years. Once understood the logics of structural shifts in the long and medium term, Nishizawa was able to transform the properties’ trend towards shrinkage and fragmentation into a powerful design catalyst, all of it without producing a literal reproduction of the surrounding porous fabric. Instead, he carefully studied the relationship between built and void in the area and took a further step, changing the scale and proportions of the interstitial spaces in order to create a hitherto inexistent architectural reality. In addition, the bonds between home and city established at Moriyama House have been tested through a detailed study of the lot’s boundaries. Commonplaces about the “absence of borders” were examined with alert and suspicion, not only from a physical point of view but above all, taking psychological aspects into account. This “subjective” analysis led to a further reflection on the particular lifestyle embedded in Nishizawa’s proposal; one that escapes conventional categories of domesticity and succeeds in questioning traditional spatial binaries such as public-private or interior-exterior space.

In sum, this paper has proved how an attentive inquiry into the larger context of an architectural project –considered not only as a formal problem, but in all its multifaceted complexity– could be able to transform a seemingly primitive scheme –conceiving a house as a set of detached boxes– into a highly sophisticated project strategy. In this sense, Moriyama House definitely serves as an illustrative example for a wider reflection on a timeless challenge for architects: the possibilities of dialogue that residential buildings –even at a tiny scale– can establish with their surroundings; in other words, the capacity of a housing project to behave as an active component within the city, taking into consideration the influence of time and urban processes at different scales.
Ultimately, Moriyama House constitutes an interesting “round-trip experiment”. The public and urban scale serve as an incentive to rethink further aspects within the most intimate realm of the household. And the other way around: a deep reconsideration of domesticity from a programmatic, sociological and psychological point of view is transformed into a determining factor to confront the way the building is related to the city. As Nina Bassoli puts it, explaining what she calls “the hidden urbanism” in Japan, “it is possible to start out from the design of small places on the domestic scale and generate transformations on a larger scale, connected with an expanded dimension of living” (Bassoli, 2017). Both lines of thought (from home to city and vice versa) coexist from the very beginning of Nishizawa’s project, becoming mutually interdependent and making it impossible to determine which came first.

Without doubt, this project holds several key lessons for the complex challenge of intervening within today’s ever-changing metropolises, just as much as it constitutes an innovative territory of thought about the meanings of inhabiting in contemporary cities.

REFERENCES


10. Invasion of free-standing objects and plants in both indoor and outdoor space. Drawing by the authors, 2017.