



Article Urban Resilience: A Study of Leftover Spaces and Play in Dense City Fabric

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Abstract: Cities worldwide are urgently moving towards a more resilient and sustainable future. On this quest, national, regional, and local governments apply a combination of socio-spatial tools that regenerate and transform the city's leftover spaces. There is an abundance of community gardens, cultural centers, and large-scale urban developments that, through programmed activities, reactivate underused spaces. The bearers of this process are professionals and individuals who have become aware of their actions in the contemporary urban landscape. This paper highlights possible design strategies that domesticate leftover spaces of diverse scales by injecting creative and playful programs, using Tokyo as a paradigmatic case study. More so than other global metropolises, the city represents a living laboratory for experimentation due to its compactness and the variety of urban patterns. Its leftover spaces demonstrate how play positively affects everyday life in public spaces, and how it enables extraordinary uses. A combination of ethnographic observations and spatial analysis is applied as a trans-disciplinary method. This approach allows an understanding of how people use playfulness to transform, appropriate, and utilize leftover spaces, which serves as guidance for urban planners and designers.

Keywords: leftover space; design strategies; Tokyo; density; play

1. Introduction

1.1. State of the Art

Beginning in 1973, the American artist and architect Gordon Matta Clark started to buy lots auctioned by the city of New York. He purchased 15 lots in total, 14 of them in the district of Queens and 1 in Staten Island [1]. The lots had common spatial features: they were unused, residual, and physically inaccessible. The price was between USD 25 and USD 75, and there was a diverse range of shapes. After the purchase, they were mapped, photographed, and cataloged for his famous artwork Reality Properties: Fake Estates (1973).

Through this operation, he questioned the city's logic of land subdivision, property value and ownership. His work revealed visually how the city produces oddities and contradictions in terms of private properties and boundaries and when interviewed he declared:

When I bought those properties at the New York City Auction, the description of them that always excited me the most was "inaccessible." They were a group of fifteen micro-parcels of land in Queens, left-over properties from an architect's drawing. One or two of the prize ones were a foot strip down somebody's driveway and a foot of sidewalk. Additionally, the others were curbstone and gutter space. What I basically wanted to do was to designate spaces that would not be seen and certainly not occupied. [2]



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Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). Matta Clark highlighted for the first time how the (re)presentations of an idle space can trigger others' various readings and that its identity is not static in time or pre-established but instead can have a dynamic trajectory [1]. His work for the first time had interpreted visually a discussion on leftover spaces that soon after in architecture, urbanism, and planning, were widely investigated, taking on various concepts and interpretations.

Trancik [3] was the pioneer of theoretical research on leftover space in an urban context. He has defined it "as 'lost space', as such spaces were ill-defined, had no significant outlook, and had a negative impact on the built environment." Leftovers are a part of the urban system because their cause most of the time is related to planned developments and city regulations [4]. They are characterized by uncertainty [5], they are meaningless to most people [6] and without a function [7]. They can be considered simply as waste but ultimately are new realities with a stratified identity. They can be an object of conversion which needs new tools of transformation [8].

Formally, leftovers allude to the empty voids and gaps between every solid of the urban fabric (i.e., buildings, infrastructures, etc.) [9]. In everyday life, some familiar examples of leftover spaces are found underneath infrastructure, or in between buildings or fences, with variations in size and ownership. They will always be present in architecture due to the way it creates boundaries and divisions in space, provoking problems in both the social and physical fabric [10].

Referring to contemporary photographers and theorists (photographers cited by Sola-Morales in its exploration are John Davies, Davis Plowden, Thomas Struth, Jannes Linders, Manolo Laguillo, Olivio Barbieri, and the theorist Rosalind Krauss), Sola-Morales [11] defined this condition with the term "terrain vague". Here, the word *vague* assumes three meanings:

- 1. "Wave" defined as "the German *Woge* referring to a sea swell, significantly alluding to movement, oscillation, instability, and fluctuation" (p. 119);
- 2. The English words "vacant" and "vacuum" meaning "empty, unoccupied, yet also free, available, unengaged. The relationship between the absence of use, of activities and the sense of freedom, of expectancy, is fundamental to understanding the evocative potential of the city's *terrains vagues*." (p. 120);
- 3. "Vague" from French, and derived from Latin, alludes to a sense of things being "indeterminate, imprecise, blurred, uncertain" (p. 120).

To enhance the identity of the *terrains vagues*, Clément [12] coined the concept of *tiers paysage* (third landscape) for places of unexploited richness in terms of biodiversity. This refers to every "abandoned" area, from nature reserves to smaller and almost invisible natural fragments, such as tufts of weeds at the roadside. It is in fact the not-human occupation that generates the *tiers paysage*, a refuge for biological diversity preserved by the absence of human exploitation. Today, gardeners, or better the *jardiniers planétaires* [12], need to understand our fragmented landscape through an ecological approach that respects the biological diversity of abandoned spaces. While following the natural course, the *tiers paysage* becomes an active tool for ecological regeneration and landscape design (the design of the *Jardins du Tiers-Paysage* in Saint-Nazaire, France in 2011 is an example that embodied Clément's theory in action).

Nielsen [13], who denominated abandoned spaces as "superfluous spaces", emphasizes their social potential and sees them as spaces that accommodate the rituals and meanings of people. He claims that these "backsides" of the city are an alternative to "the increasingly staged and controlled primary public spaces of the urban center" [13,14].

Leftover space, idle space, space pocket [15], residual, interstice [16], gap, in-between, *terrain vague, tiers paysage* or superfluous spaces: researchers and practitioners may have referred to the concept by various names over the decades, but regardless of denomination, all authors have seen the potential in "the waiting for use" and richness which can be ignited by users' creativity and tenacity.

1.2. Research Focus

At the same time, urban planning discourse recognizes the dialectic relationship between the urban setting and its immediate users as a path towards resilience, which is defined as "the ability of a system to adapt and adjust to changing internal or external processes" [17]. A holistic approach has been arrived at, one that along with the resilient urban structure (form, "hardware") encompasses the behavior and interests of urban agents (process, "software") [18], and that articulates not only the physical form but also its programmatic components [19].

In dense urban settings, this means adaptation and adjustment of previously neglected and/or overlooked spaces, which often mitigate the existing infrastructure. Through urban design strategies and the implementation of intentionally designed spatial elements, previously neglected slots have become more than spatial solutions: their transformation brings new possibilities and connections, and they become places for dialogue, meeting, and exchange (for example, playgrounds built by Aldo Van Eyck after WWII or the recent British Film Institute project from [20]).

Furthermore, this holistic approach means that the roles of urban planners and designers have changed: "the designer surrenders their authority and becomes an 'enabler' rather than a 'decider' [21]." Collaborative design processes enable and engage multiple stakeholders to adapt, adjust, and appropriate their immediate environment, and maximize the socio-spatial potential of the previously neglected places. The incremental housing approach proposed by Aravena [22], and developed at Villa Verde, is an example of how a designed "half-house" enables an incremental extension [23]. The incremental housing approach "harnesses knowledge about the critical stages of informal development and provides various support interventions to guide development toward positive outcomes. [24]" It balances aesthetics with affordability, balances low-rise, high-density building envelopes, limits overcrowding, and allows for the possibility of expansion [22]. Furthermore, locally based social practices re-create multiple readings and manifold values. In this context, understanding and interpreting the activities and behaviors rooted in the place has become a necessity, which is reflected in the emergence of multidisciplinary methodologies and disciplines that merge qualitative and quantitative approaches [25].

Of special interest to researchers are spatial conditions that allow an exchange between the residents and their immediate surroundings, as illustrated by "Reality Properties: Fake Estates" and the "half-house" project.

Since 1987 and the Brundtland report [26], followed by the 1992 Rio Declaration on Environment and Development [27], and up until the New Urban Agenda, Habitat III [28], urban sustainability, in theory, and cities, in practice, have been moving towards (more) sustainable development. The production of a resilient urban structure that implicates the behaviors and interests of urban agents has become a widely acknowledged goal. Participation of more than half of the world's population is critical in reaching this goal. Hence, in urban discourse, it is critical to understand their behaviors and enable positive outcomes when interacting with the neglected or overlooked urban voids.

This paper aims to contribute to the discourse with the main research question:

How can urban design strategies reframe leftovers as vectors of social and spatial resilience?

It observes and learns from the socio-spatial conditions of leftover spaces in dense city fabric to decipher underlying relationships between space, activities, and behaviors and to understand the conditions which contribute to the resilient nature of leftover spaces regardless of the infrastructural conditions.

2. Materials and Methods

2.1. Tokyo as a Paradigmatic Case Study

More so than other global metropolises, Tokyo has become a living laboratory for experimentation due to its compactness and variety of urban patterns. On the one hand, a massive metropolitan scale that constitutes the city's hard apparatus is defined with

the expression of "bigness" by Koolhaas (1995), in which identity coexists with size and quantity. Additionally, on the other hand, the city's fine human-scale urban fabric reflects the inhabitants' emotions, beliefs, and aspirations [29].

The city is often described as a city of conflicted (schizophrenic) realities with "daily living spaces paradoxically small in an overall bigness [30]". Historically, the city has been defined by a characteristic "low-rise and high-density" urban fabric, that even today remains one of its main spatial features. However, the city planning regulations and new development have been gradually but constantly transforming the urban pattern towards a "high-rise, high-density" model. As a result, the metropolis lies at the juxtaposition of two extremely different scales, with the maximization of the urban footprint as their common feature.

Tokyo's juxtaposed "bigness" and "smallness" are interconnected by an extensive network of public transportation, by an idiosyncratic infrastructure that interacts with urban tissue and forms an additional variety of urban patterns. The interaction of each urban element results in what can be expressed as a "scrambled" landscape, the concept that firstly appeared on the diagram "The City as an Egg" made by Cedric Price in 1982 [31]. Three types of eggs are associated with the city's evolution. Firstly, a boiled egg symbolizes the "walled city" with a precise definition between city and countryside. Secondly, a fried egg shows the modern city where the periphery takes shape around the historical core. Thirdly, a scrambled egg reproduces the contemporary metropolis with multiple centers. A concept in the famous diagram represents no clear distinction between blended elements. Tokyo's mixture of infrastructure and public space originated from the urban element of sakariba [32]. This was an expression adopted in the Edo period (1603–1867) that referred to an entertainment area. The term is composed of two words: *sakaru*, to be active, and *ba*, expressing "place", which collectively defined all the environments that provided pleasure. During the Edo period, sakariba areas emerged naturally in open spaces, transitional zones, in the space of trade and shipping, near bridges, located next to business districts and public transportation, and their attractiveness lies in them being easily accessible from work, which makes them part of Japanese workers' daily routine.

Another conceptual keyword, which characterizes Japanese urbanism and helps understand Japan's hybrid urban space, is the term *kaiwai*, translated as activity space constituted by "the set of individual activities of people, or the accumulation of devices that trigger a set of activities" [33,34] (p. 32). The concept of *kaiwai* stands for "the ways in which ordinary people appropriate space spontaneously and the kinds of places that accommodate and lend themselves to this spontaneous appropriation [34]". Appropriation can be traced through the abundance of visible temporary elements and personal belongings, called *afuredashi* [34]. Occupying leftover spaces besides houses and stores, mostly in traditional small-scale downtown *shitamachi* districts (commonly translated as downtown districts where the slow pace of life in quiet residential neighborhoods is juxtaposed with large-scale buildings), these elements add to the scrambled cityscape image and become one of its main characteristics.

A significant shared feature of the concepts introduced here is their transient, temporal aspect. The ephemeral feature of *sakariba* provides this urban element its identity, as the usages associated happen in an exact period between the Japanese notion of *hare* (time for pray) and *ke* (time for work). *Kaiwai* is an ephemeral construct that stands for the multitude of constantly reiterated everyday practices in all their varieties, while *afuredashi* objects, despite their permanent presence in the urban landscape, are constantly moved, replaced, and organized in unpredictable ways.

2.2. Boundaries of the Target Areas and Selection of Case Studies

Tokyo's boundaries are as multiple, overlapping, and transient as the city itself. From an administrative perspective, Tokyo Metropolis with its 23 central wards is commonly perceived as "Tokyo" (Figure 1), while the Tokyo Metropolitan Area includes 26 cities, three towns and one village in addition to the 23 central wards [35,36]. Other definitions of Tokyo borders include municipalities whose population commutes to central wards daily; and finally, there is the Greater Tokyo Area, which includes neighboring prefectures Saitama, Chiba, and Kanagawa. In this study, the focus is on Tokyo Metropolis, even though the targeted spatial conditions are not uncommon within the Metropolitan and Greater Tokyo Area due to the uniformity of planning regulations [37,38].



Figure 1. Boundaries of Tokyo and case studies (source: authors).

The spatially smallest and least populated among the 23 central wards are *shitamachi* districts, located in the heart of central Tokyo. The typical slow-paced life remains unchanged as well as the typical spatial fragmentation into districts (*cho*), which are further divided into blocks (*chome*), where neighborhoods and identities are formed [39] despite the intensive transformation of the metropolis. This fragmentation of wards, cities, towns, and villages, into smaller spatial units is a common characteristic of Japanese urban space. As a result of the uniform land use regulations, spatial conditions in the Greater Tokyo Area resemble, and conflicts of ever-expanding transportation infrastructure and a historically dense built environment remain.

Case study selection is inspired by the classification proposed by Azhar and Gjerde [40] who divide the in-between spaces within urban areas into two qualitative categories: continuous (transitional) spaces and discontinuous (temporal) spaces. They further define six types of leftover spaces at a micro level located in the front, at the sides, and at the rear of buildings, at the edges and corners of roadways, around and between buildings, and on rooftops. Following this classification in a Tokyo context, the selected case studies are found (1) underneath the bridge and at the station rear (Ichigaya Fish Center), (2) at the edges and corners of roadways (Jimbocho, the book town), (3) below infrastructure (Shimokitazawa Cage), and (4) around and between buildings (Taito extrapolated home environments).

This paper is a continuation of research about leftover spaces in public and private spheres based on the previous separate studies of the domesticated urban environment [41] and infrastructure reuse [29] in Tokyo. To understand the nature of these spaces in different urban settings, previously developed methodologies are merged into a multi-layered method that includes morphological and ethnographic approaches.

2.3. Methodology

The case study analysis is based on a mixed methodology that combines quantitative data, the "hardware", and qualitative data, the "software" [42]. The potential of spatial

configuration and its creative uses allow various readings and interpretations of everyday life situations, in which the (once) lost voids presented become actors of resilience.

Firstly, for the spatial analysis of each void and its relation to the urban context, the hardware analysis is based on the work of Almazan and Suzuki [43] who apply a morphological analysis of both the interaction of spatial elements externally—through the links with infrastructure and the outer surroundings—and internally—the street pattern and relationships.

Secondly, to understand people's behaviors, the software is analyzed using a combination of ethnographic methods. Observation consists of data collection in situ by (1) walking, which "as a metaphor for reading, remains the best way to capture the contents of daily life within shared spaces [44,45]" and (2) photographing the "inexplicable protuberances and concavities connected to buildings and streets in the city" [34,46] (p. 88). This approach was initially adopted in the 1980s, when ethnography acknowledged and accepted visual methods as a meaningful element of urban research [47,48]. In Japan at the time, the Street Observation Society members photographed *bukken*, the uncommodified objects attached to buildings [34]. The observationists simply recorded, classified, and described their discoveries, interpreting found objects as "fragments of the whole to which they once belonged, rather than for the intrinsic interest or beauty of the fragment itself [34]". Similarly, in this study, photographs of objects collected during the walks are used as a form of data, rather than for their visual appeal. They are recorded, classified, and interpreted to access the social world, whilst also "forming an archive of that world [49]".

Four selected sites were visited on a weekday, when the daily life of leftover spaces unfolds. The following steps were used to create a sheet for each case study (Table 1).

	Dimension	Focus on	Data and techniques	Analysis and interpretation	Discussion
Leftover space	Hardware (morphology)	External connection and internal configuration	Google Maps GIS mapping	Potential of leftover spaces'	Design strategies
	Software (appropriation of space)	People's activities, elements, and objects	Photographs Observation	accommodate specific behaviors	

 Table 1. Research stages and methodology.

1. External connection

In order to understand the physical characteristics of each leftover space in terms of how they link to the planned urban system, each void is analyzed in relation to the main existing morphological elements: buildings, infrastructures, and public spaces. The data were retrieved from Google Maps and a geographic information system (GIS) to create a navigation plan that illustrates relationships between critical spatial elements (navigation map).

2. Internal configuration

The spatial configuration of each case study is analyzed three-dimensionally in terms of architectural elements that have been found on site (axonometric section).

3. Appropriation of space

Observations and visual methods consist of a walking routine that includes slow movement through the site while systematically taking photographs along the path. Architectural elements, urban furniture, and found objects defining leftover space were then cataloged and interpreted in relation to the action they afford (see The theory of affordances [50]). Activities and behaviors are interpreted both in the presence and absence of people, depending on the nature of the site and its public-private characteristics.

A datasheet for each case study is created associating spatial analyses 1 and 2 with visual observations 3.

4. Intersection between hardware and software

The individual case study analysis and the cross-comparison between cases are interpreted to understand the potential of leftover spaces' morphology to accommodate specific behaviors and activities. Additionally, they reveal common behaviors and activities through which individuals appropriate space.

5. Design strategies

Lastly, there is a discussion of recommendations for design strategies that strengthen the relationship between leftovers and activities.

3. Case Studies

3.1. Ichigaya Fish Center

The fishing center is at one of the more active hubs in Tokyo, at the intersection of the Kanda River and Ichigaya Station, next to the railway platform of the Chūō Main Line which passes through Tokyo, and is one of its main train lines that link the city center with the suburbs (Mitaka, Takao, Shiojiri, etc.). The overlayered system generated several types of idle space on the water attached to different infrastructure elements.

The fishing center is located underneath the bridge connecting two distinct parts of the station and the station's platform rear. Unlike other water infrastructure in Tokyo, this area has been transformed into ponds for recreational fishing, becoming a special place where people can be entertained by outdoor activity while in the proximity of the business center of Tokyo. The space is accessorized with all the necessary equipment to enjoy an urban outdoor activity: fishing equipment, seats, sunshades, benches, buckets, vending machines, and vegetation.

The fishing center and the infrastructure are connected to each other not only by the same physical boundaries but also by a shared topography. The railway stop is situated at the summit, then a series of cherry trees, with the fishing spot located at the lowest point. There are no visual fences in the middle of these elements and this layout allows a curious behavior to happen: commuters waiting at Ichigaya station watch fishers at the reservoir trying to take a fish, while they in return are patiently waiting for a fish and the same time looking at the trains passing [51].

The interstitial nature of this playground in the middle of one of the busiest business districts of Tokyo makes it a well-liked spot for a diverse mix of users: families, "salarymen" for the time of a break, couples, fishing supporters, etc. Additionally, even though this is not a case of advanced or planned design, it provides a unique point of view of the district to its users. This leftover space triggers the imagination to wander in the bigness of Tokyo (Figure 2).

3.2. Jimbocho, the Book Town

Yasukuni Dori is one of the major road arteries of Tokyo extending from its busiest commercial and financial district of Shinjuku to Chiba, one of the biggest residential areas. Near to Shinjuku hub and situated along this main road is the "contrasting" Jimbocho, also known as the "books neighborhood" or "Tokyo's book town".

Jimbocho is the second-hand book-shopping district of Tokyo, and it extends for 600 m, where around 170 bookshops inhabit four hectares of one of the densest areas of Tokyo. A quick view of the district promptly underlines its anachronistic identity, highlighted by the sharp contrast to its surroundings. Beginning in the 1920s, bookshops were built in this area because it was home to several important publishing companies and close to a cluster of universities. Many students, educators, and thinkers spent time together in this district. Still today, the neighborhood is a haptic space and a "melting pot".





Figure 2. Ichigaya fish pound datasheet (source: authors).

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The bookshops are connected to public spaces through some unique design solutions that take advantage of the shop's liminal condition, between outside and inside. Firstly, the buildings' edges are covered by shelves containing books, posters, manga, anime, and movable elements and oddities. By covering the district's vertical and horizontal surfaces, every shop creates an outer addition that changes the sidewalks and the city's walls into a permanent marketplace. Secondly, by maximizing available surfaces, the design has been adjusted around readers' needs and, therefore, many shops are able to focus on a specific topic such as Chinese art, movies, medical science, manga, computer science, vintage toys, and so on. Jimbocho has a limited surface area but at the same time, it offers a wide range of uses condensed together. Each shop has a unique identity and taste, celebrated through decorations, relics, or peculiarities displayed both inside and outside the shop [29].

The additions to the outside of the shops have changed forever the interaction between the city itself and its citizens, taking this beyond what would happen with a "mute" surface clearly defined in its border. This can provide a well-balanced environment for readers that may recreate the intimate feeling of reading right in the middle of the traffic-congested road Yasukuni. It has also resulted in the development of distinctive behaviors and traditions, whereby one can openly see the leisure time of Jimbocho's users (Figure 3).



Figure 3. Jimbocho, the book town datasheet (source: authors).

3.3. Shimokitazawa Cage

The Cage, set up by Keio Corporation, one of Tokyo's private railway operators, consists of a pop-up space for street food trucks, a multipurpose event space called the "Cage", and a parking lot. The project was designed by SPEAC Architect using the space underneath the railway. Built in 2016, it was in use until 2019 during the period of construction of the new Keio line. The Cage was designed in such a way that it did not come into close proximity to the infrastructure frame, so the pop-up space could be altered and removed without modifying the overall construction of the railway. The Cage's structure was composed of modular elements that could be adjusted according to the activities being held inside.

The project's location was in the commercial and entertainment district of Shimokitazawa, one of the main commercial and entertainment areas of Tokyo famous for its theatres, live music venues and vintage shops. Its urban structure is characterized by a compact fabric and a maze of small alleyways. Starting in 2004, the Setagaya City Council adopted a plan to redevelop a large section and change its urban's structure with new railroads and towers. Thus, it accommodated a diverse mix of programs relevant to this particular milieu. Some activities were recurrent such as markets, film events, theatrical performances, and talks, others were one-off events for which the space was rented. There were also times when the place was simply open to the community as a "chilling space", with no defined scope. Each activity needed a set layout, objects, and custom design solutions. A key feature for audio-visual purposes, such as screenings, performances, and talk events, was the wireless headsets which permitted the creation of a "sound bubble", isolating sound within the Cage so that sound was limited to the users and did not affect residents and passers-by [51].

This leftover space as an example focuses on the efficacy of using idle space in a way that helps locals gradually accept the urban conversion of their neighborhood from the familiar to the new. However, during the railway's construction, there were several conflicts with Shimokitazawa's residents regarding the demolition of the old urban fabric in the district (Figure 4)



Figure 4. Shimokitazawa Cage datasheet (source: authors).

3.4. Taito Extrapolated Home Environments

The Taito Ward is one of Tokyo's typical downtown (*shitamachi*) precincts. The ward's location is significant due to its centrality—this has been the case since the Meiji Restoration in 1868 when Tokyo became the capital of Japan. Another significant characteristic of Taito is its size: it is the smallest ward in central Tokyo covering 10,08 km². In terms of population and density, it has 203,346 residents and nearly 19,482 inhabitants per square kilometer [52]. It forms a contrast to other *shitamachi* wards (Bunkyo, Chuo, Chiyoda, Minato), where daytime and night-time population flux is significantly higher. The number of people who commute to work is by definition included in the daytime population, while the night-time population includes only the residents whose home address is registered in the ward. In The National Census List 2010, Chiyoda, Chuo, and Minato Central Wards have an index of 616.3, which makes their daytime population more than six times the night-time population. This is due to the residential character of Taito, in contrast to the neighboring business districts whose working population commutes from other districts, where they live, to *shitamachi* districts, where they work.

The low-rise and high-density residential blocks in Taito, which accommodate homes and small enterprises (such as manufacturing, wholesale, etc.), remain the site of a slowpaced lifestyle. Life unfolds in between the low-rise buildings and leftover spaces appropriated by owners of the nearby buildings. These confined spaces have irregular forms that are void inside the buildings' footprint and are commonly accessible to pedestrians and only partially to cyclists. The physical barrier which separates these spaces from their surroundings and from the street takes the form of an elevated curb stone that becomes a threshold between two spheres. Once accessed, a plethora of personal belongings (small objects) is exposed, each with multiple purposes (from purely decorative such as toys to practical such as maintenance equipment) [41]. Inside the residential block's void, architectural elements (e.g., sliding doors, mobile curtains, or canopies) are used to support this "playful infrastructure".

Some of the objects (belongings) are attached to the architectural elements while others are standalone elements at the intersection of lots, buildings, and streets. Despite the overflow of the private sphere into the public sphere, the "silent agreement" between individuals is apparent: individual personal belongings do not intrude on one another. Observers witness a variety of practical and decorative expressions reflecting the interests and hobbies of their creators who paint (fences, walls), arrange (pots, flowers, shoes), and store (tools, construction materials), etc., separately, but collectively create a vivid symphony of "protuberances" and "concavities" [34]. Individual actions and, through actions, appropriation of confined leftover spaces become agents in the production of place identity. They re-create the *shitamachi* atmosphere and re-build common spaces in in-between spaces, on the doorstep, freely expressing the owners' individuality, triggered by the presence of "others". These spaces extend across the boundaries of open/close, interior/exterior, private/public [7], and temporary/permanent (Figure 5).



Figure 5. Taito domesticated environment datasheet.

4. Results

This research gives an insight into the potential of leftover spaces' morphology to accommodate specific behaviors and activities on the one hand, and on the other hand,

it reveals common behaviors through which individuals appropriate leftover space. The findings organized in Table 2 can be read horizontally and vertically.

Table 2. Cross-comparison of four case studies and their interpretation.

	Ichigaya	Jimbocho	Shimokitazawa	Taito			
Hardware	Proximity to business and commerce areas. High-rise, high-density Fishing pond and shops at the station rear	External of Proximity to business and commerce areas. High-rise, high-density Internal co Book marketplace and charge at the addres and	connection Proximity to commerce and residential areas. Low-rise, high-density onfiguration Flexible event space	Proximity to residential areas and commerce. Low-rise, high-density Domesticated spaces.			
	and underneath the bridge	corners of roadways	underneath bridge	the buildings			
	Elements and objects						
Software	Standalone objects (e.g., chairs, tables, seats, sunshades, benches, buckets, plant pots)	Attached elements (e.g., shelves, bookcases, canopy); Standalone objects (vending machines)	Standalone objects (e.g., benches and tables)	Attached elements (e.g., shelves, scaffolding); Standalone objects (gardening tools, clothes, toys)			
	Activities						
	Fishing, sitting, daydreaming, trainspotting	Reading, looking around, strolling	Listening to music, relaxing, sitting, looking around	Arranging, gardening, cleaning, maintenance, painting			
Intersection between hardware and software							
існідаха							
Image: shimokitazawa							
		Design s	strategies				
	Proposing a program to afford outdoor play and informal social play to counterbalance the business and commerce	Designing flexible facades in high-rise districts and movable urban furniture which accommodate individual and solitary play	Adding temporary architectural elements that afford multiple forms of social play to mitigate the effects of infrastructure	Creating and/or leaving confined spaces as intentional voids that trigger subjective play in proximity to places of residence			

Vertically, the table separately lists spatial and social findings for each case study, then the axonometry associates the spatial analysis ("hardware") with the visual observations ("software") in 3D. Lastly, the table extrapolates lessons that can be learned from Tokyo's leftover spaces and be applied elsewhere as a design strategy.

Horizontally, the multi-layered diagram allows cross-comparison of case studies and their interpretation.

5. Discussion

The matrix of Tokyo's leftover spaces can be interpreted in several ways.

From an ethnographic point of view and based on a "horizontal" comparative reading, each case study triggers behaviors related to playfulness. Multiple forms of play are identified and classified following Sutton-Smith [53]: from subjective and mostly private (daydreams), to solitary (hobbies, reading, gardening...) and playful behaviors (playing around), to informal social play (pleasure, party...), celebrations, and festivals.

It is observed that play and playful behaviors constantly strengthen the relationship between leftovers and users. The longevity of three cases (Ichigaya, Jimbocho and Taito), also highlights how play becomes a vector of social and spatial resilience despite the constant urban transformation of Tokyo. From the morphological point of view, leftover spaces in Ichigaya and Shimokitazawa, both linked to transportation infrastructure, accommodate informal social play, celebration, and festivals (a contemporary activity space or *"kaiwai"*). These types of playful behaviors are triggered by the use of standalone objects. On the other hand, in Jimbocho and Taito leftover spaces around building edges and corners are transformed using attached architectural elements *("afuredashi"* and *"bukken"*). The small scale of these temporarily transformed sites is the condition that triggers intimate and solitary activities.

By looking at ethnographic and morphological readings, the four Tokyo cases show how the urban context influences the success of certain playful behaviors in leftover spaces even in their underused state.

The Ichigaya and Jimbocho case studies highlight how the proximity of a business district can be linked to fishing, reading, and outdoor play, and provide an easily accessible, refreshing break to suited salarymen from their busy working schedule. Shimokitazawa Cage, meanwhile, is a relaxing spot in the busy, overloaded entertainment district (as in *"hare"* and *"ke"*). Finally, Taito could be seen as a constellation of meditative micro-gardens attached to houses.

If for Clement unexploited spaces are treasure troves of encapsulated ecological diversity and each has unique potential according to the interaction with the surrounding environment, Tokyo cases could likewise be interpreted in terms of socio-spatial diversity. Metaphorically, like plants' surroundings, the surroundings of leftover spaces become an element of impact through their material and immaterial forces.

Furthermore, the intersection of the two readings identifies the significance of borders and boundaries. In Taito and Jimbocho, the spatial borders of leftover spaces remain flexible and have an ephemeral nature represented by the daily movement and replacement of attached elements and objects. Meanwhile, borders remain rigid in Shimokitazawa and Ichigaya, where standalone elements are movable but remain within the borders of leftover space. In terms of boundaries, the playful behaviors facilitated by the spaces allow overlap and serve to engage people. They "enter" into the zone of play, engage with "others" and whether in a temporary event—during a festival, on a lunch break—or in a limited constrained space—small residential lots along street edges and between buildings—they cross socio-spatial boundaries.

In dense urban environments, these playful forms of socio-spatial appropriation become resilience tools that designers develop in relation to the specific spatial context. Design strategies take different directions, strengthening the relationship between leftovers and activities by:

- 1. Proposing a program to afford outdoor play and informal social play to counterbalance business and commerce. Ultimately, programmed activities facilitate exchange between people and the environment.
- 2. Designing flexible facades in high-rise districts and movable urban furniture which accommodate individual and solitary play. The designer surrenders their authority and becomes an "enabler" rather than a "'decider'" [21,22].
- 3. Mitigating the interaction of infrastructure and urban tissue, which maximizes affordances and the potential of leftover spaces. As in the historical cases of *sakariba* between infrastructure and collective space—and *kaiwai*—the activity space—this can be a temporary approach within long-term urban development projects.
- 4. Creating and/or leaving confined spaces as intentional voids, which triggers subjective play in proximity to one's residence. This strategy enhances individual maintenance of neglected and non-belonging spaces and strengthens collective identity (as "superfluous spaces," creation of alternative public spaces that accommodate the rituals and meanings of people [13]). The vagueness of space becomes a quality that triggers appropriation and personal expression.

Consequentially, in spatial terms leftover spaces gain specific character and become an active category that allows multiple behaviors. In social terms, those space pockets, interstices and/or in-between spaces become meaningful environments. As in the strategies identified in this paper, leftover spaces become half-finished alternative public spaces, micro-gardens, places for rest and relaxation, solitary places, temporal constructs, and open possibilities.

6. Conclusions

The case studies in this study integrate the presented space-centric approaches to leftover spaces, visible in "lost spaces," "*terraine vague*," and the user-centric approaches visible in "superfluous spaces" and "half-houses". Due to the specific urban conditions and characteristics, Tokyo's leftover space is not "lost", "vague" or neglected but rather, it is an interplay of space, activity and behavior embraced by commercial, institutional, and individual stakeholders. Strategic and tactical lessons learned from the four specific case strategies can be useful to contemporary city developments worldwide that are dominated by neoliberal economic agendas. Deeply rooted in the cultural context and urban concepts of "sakariba," "kaiwai," and "afuredashi," the four urban tactics associated with these playful activities transform leftover spaces into places that enable individuals to assign multiple, overlapping, and contradictory meanings [54], and offer opportunities for creativity, recovery, and resistance [55].

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