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Triggering Spontaneous Self-Regeneration in Cities: Towards a systemic approach to spatial design

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Triggering spontaneous self-regeneration in cities. Towards a systemic approach to spatial design

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The recent theory of planning and urban design highlights how healthy vibrant cities behave as complex adaptive systems that are subject to spontaneous cycles of regeneration and decline. Although such systems cannot be designed entirely top-down or controlled, they can be influenced. In this perspective, the present paper investigates the potential of spatial design to intervene in site-specific adaptive cycles, in order to foster processes of spontaneous self-regeneration and prevent or invert emergent decline. Such a systemic approach to spatial design endeavours to frame the most appropriate type, position and scale of minimum interventions which can maintain the system between the extremes of uniformity and diversity, stability and dynamism, thus preserving its adaptive capacity. This approach is illustrated and tested here by presenting two projects which succeed in (1) increasing the system's ability to keep self-organizing in new better social-spatial configurations (which can neither be predicted, nor predetermined), (2) triggering cross-scale incremental positive effects which extend in time far beyond the scale of the project site, and (3) minimizing social and economic costs, an aspect which is particularly relevant at a time when economic resources are extremely limited.

Keywords: spatial design, complex adaptive systems, urban regeneration, self-organization, multi-scale thinking

The city as a complex adaptive system: challenges for spatial design

The recent theory of planning and urban design highlights how healthy vibrant cities or neighbourhoods behave as complex living systems: open, non-linear, emergent, self-organizing (Allen and Sanglier, 1981; Portugali, 1999; Johnson, 2001; Dovey, 2012; De Roo, 2016, 2017; Porqueddu, 2018a). The main characteristic of such complex urban environments is that their evolution cannot be predicted in advance because it arises from unexpected interactions between physical creation and social behaviour (Sennett, 2013). Furthermore, their overall shape at the macro-scale cannot be predefined or controlled because it emerges from unforeseen (social-spatial) local interactions rather than being predetermined by an *a priori* intention (Porqueddu, 2018b, Moroni and Cozzolino, 2019).

The emergent nature of complex self-organizing systems is incompatible with forms of overdetermined top-down design which materialize into overall projects where everything is predefined from the micro- to macro-scale (Porqueddu, 2018, 2020). Nonetheless, such systems need some form of direction. In fact, they can also spontaneously veer towards their decline. In this respect, Jacobs (1961) foresaw how the same forces which nourish city diversity can also contribute to its self-destruction. The recent theories of Complex Adaptive Systems and Panarchy have validated Jacobs' insights by demonstrating how complex systems spontaneously follow cycles of self-regeneration and decline (Miller and Page, 2007; Gunderson and Holling, 2002).

After Jacobs' pioneering work, planning scholars have adopted CAS theories in analysing the development of neighbourhoods, cities and regions, and to explain the emergence of urban socio-spatial patterns (Thrift, 1999; Portugali, 1999; Hillier, 2012; Batty, 2013). This ability to detect emergent patterns makes it possible to intervene when self-organizing processes head in an undesired direction (Rauws, 2015).

While strategies aimed at influencing Complex Adaptive Cycles and related Self-Organizing processes in cities have been explored in Planning Theory (De Roo and Rauws, 2016; Moroni and Cozzolino, 2019), they have been under-investigated in the spatial design disciplines. In this respect, the present paper aims at exploring the role of spatial design in triggering (or accelerating) processes of spontaneous self-regeneration in cities and in preventing or inverting emergent cycles of decline.

The first section of the paper focuses on the main aspects of CAS and Panarchy theories which are relevant to understanding and managing adaptive cycles in cities. The second section highlights the main conditions for preserving the adaptive capacity of complex urban systems. The third section identifies two possible approaches through which spatial designers can proactively interact with complex adaptive cycles of self-regeneration in cities and presents two projects which are useful for exemplifying and testing the proposed approaches. The fourth section traces some final remarks concerning the implication of the aforementioned theories for spatial design disciplines and the advantages in applying a systemic approach to spatial design.

Understanding Complex Adaptive Cycles across Scales

The present section briefly illustrates the main aspects of CAS and Panarchy Theory which can be relevant for spatial design theory and highlights their resonance with Transition Theory. It then traces some connections with the pioneering work of Jane Jacobs, who observed spontaneous cycles of self-regeneration and decline in cities long before CAS and Panarchy Theory were conceived and subsequently applied to urban studies and planning theory.

Complex Adaptive Systems (CAS) theory shows how complex systems evolve through adaptive cycles and how it is necessary to recognize these cycles in order to prevent their decline and foster their ability to self-regenerate. These recurring cycles consist of four phases: rapid growth, conservation, release, and reorganization (Gunderson and Holling, 2002; Miller and Page, 2007). During Rapid Growth, the system's components are weakly interconnected, and its internal state is weakly regulated. This is the time for innovation and growth. The transition to the conservation phase occurs because the system becomes more strongly interconnected and regulated: different ways of performing the same function (redundancy), are eliminated in favour of performing the function in the most efficient way (efficiency). The cost of efficiency is a loss of flexibility: such a system is increasingly stable, but over a decreasing range of conditions. In other words, its resilience declines. Under a small shock, the system's web breaks apart and suddenly comes undone. The release phase is brief and chaotic, but the destruction that ensues has a creative element: tightly bound capital is released, and all options are open. This quickly leads to a phase of reorganization and renewal. Novelty arises in the form of new inventions, creative ideas and people.

The point in managing adaptive cycles then becomes how to prevent a large collapse in the late conservation phase or to accelerate a reorganization phase, if the collapse has already happened. In the first case, the strategies elaborated by intelligent managers usually consist of undoing some of the constraints of the conservation phase, in order to navigate a graceful passage through the growth phase, without falling into a release phase (which is costly and unpleasant and involves the loss of capital) (Gunderson and Holling, 2002; Walker and Salt, 2006). In the second case, some actions can be undertaken to foster the emergence of the new inventions and connections which can accelerate the transition from the chaotic release phase towards the growth phase.

Panarchy (Gunderson and Holling, 2002) theory is also crucial as it stresses how complex adaptive cycles and feedback loops develop across scales. A crucial point in this theory is to consider that the scale in which we are interested is connected to and affected by what is happening at the scales above and below, and that the linkages across scales play a major role in determining how the system is behaving on another scale. In this respect, if we fully consider the city as a complex living system, we cannot successfully interact with it by focusing on only one scale. In this sense, CAS and Panarchy Theory also resonate with Transition Theory, which explores how patterns in system innovation emerge from the interplay between dynamics at multiple levels (MLP) (Geels, 2004; Öztekin and Gaziulusoy, 2019).

In cities, self-organizing processes of regeneration and decline were observed by Jacobs (1961) long before CAS and Panarchy Theories were developed and applied to urban studies. Jacobs foresaw the tendency for outstandingly successful diversity in cities to destroy itself across time cycles, which she described in six famous steps: (1) in some places a diversified mixture of uses becomes a popular and successful assemblage, (2) this success fosters an ardent competition for space, and the locality develops, (3) only a few dominant uses emerge: the winners of the competition represent only a narrow segment of the many uses which together generated success, (4) visually and functionally, the place becomes monotonous and loses its appeal, (5) the locality's suitability, even for predominant use, declines, (6) the place becomes marginal. With regard to Self-Destruction Theory, Jacobs's observations also revealed how linkages across scales are a key aspect in understanding diversity and resilience cycles in cities. Indeed, she argued that streets which experienced the self-destruction of diversity after a successful period (late conservation phase), could quickly regenerate their diversity (from release to rapid growth), only if they were surrounded by other streets that were in a phase of flourishing diversity (rapid growth). That is to say that in this case a micro-cycle can be positively affected by wider scale processes and vice versa. Managers who understand adaptive cycles across scales often avoid a release phase at the scale of concern by triggering release and reorganization phases at lower scales, thereby preventing the development of a late conservation phase at the scale of concern (Gunderson and Holling, 2002; Walker and Salt, 2006).

The following sections illustrate how these theories make it possible to frame the physical space as a component of a complex system which includes human actions (Portugali,2013; Moroni and Cozzolino,2019; Porqueddu, 2020) and which evolves in time following non-linear trajectories and adaptive cycles.

Enhancing the system's adaptive capacity

CAS theory shows how the maximum adaptive capacity emerges when the system remains "on the edges of order and chaos" (Waldrop, 1992), when it keeps flowing between two extreme points: uniformity, a position close to equilibrium which renders the system inert, and diversity, a position so far from equilibrium that the system could collapse. Between the two extremes of uniformity and diversity, efficiency and redundancy, stability and dynamism, a complex system is able to adapt and to self-organize, to change by means of internal dynamics while building on layers of robustness, through which it will be able to survive. In other words, Complex Adaptive Systems are at the same time robust and dynamic, uniform and diverse, efficient and redundant. Their dynamism is fostered by a robust layer that is able to support change. When some external forces exert pressure for internal adjustment, a set of cohesive conditions is crucial, allowing the system to adjust while keeping it functionally together (De Roo and Yamu, 2015).

In CAS Theory, Self-Organization processes, which concern the spontaneous emergence of order out of disorder (Prigogine and Stengers, 1984), have a prominent role in maintaining the system's adaptive capacity (Boonstra and Raws, 2016). In this respect, the literature on complex systems and self-organization distinguishes between Autopoietic and Dissipative system behaviour (Van Meerkerk et all., 2013). Autopoietic Self-Organization refers to the self-maintenance and reproduction of the system (Jantsch, 1980; Luhman, 1995) and is aimed at stabilizing it. Dissipative Self-organization (Prigogine and Stengers, 1984) is boundary breaking, leading to the evolution of systems. Dissipative self-organization refers to the increasing connection of various subsystems leading to a far-from-equilibrium situation in which small changes in the components of a system might lead to large scale change (Morçöl, 2005:11).

Complex systems (both physical and social) that show both types of self-organization are in a condition of 'bounded instability' (Merry, 1999) in which they can find 'the mix of confirmation and novelty' that maximizes their adaptive capacity. In a situation of equilibrium, the system is too static to be fully adaptive to new, unexpected situations. It can grow isolated and thus become irrelevant to its environment, and unable to learn, evolve and renew. On the other hand, when the system is totally unstable, it is incapable of responding in a coherent way to new challenges and could easily fall into chaos and decline (Van Meerkerk et all., 2013).

In cities, the enabling and constraining conditions which might nourish or threaten the adaptive capacity of a certain social-spatial network can be very heterogeneous: they can concern the set of rules (Moroni, 2015; Moroni and Cozzolino, 2019), certain kinds of policies (De Roo and Yamu, 2015; Rauws and De Roo, 2016;), the taxation system, the distribution of property or land prices (Dovey, 2012; Dovey and Symons, 2013, Moroni and Cozzolino, 2021). In the following section, I will highlight how spatial conditions can also be crucial in fostering the adaptive capacity of specific socio-spatial systems and how designers can improve their ability to shape such conditions or intervene in their evolution.

Influencing complex adaptive cycles: two spatial design approaches

This section identifies two possible ways in which spatial design can contribute to maximizing the adaptive capacity of place-specific socio-spatial systems, thereby triggering or influencing self-organizing cycles of regeneration.

The two approaches are illustrated and tested by presenting two spatial design strategies which have a crucial role in fostering a condition of 'bounded instability' in their area of influence. Although the designers of these interventions do not mention the theories presented in this paper, I will highlight how these projects represent significant examples of how spatial designers can proactively cooperate with complex adaptive cycles and self-organizing processes in cities. The subsequent paragraphs start with a description of each approach, which is then followed by a concise illustration of the case-study aspects that are relevant in supporting it.

Designing incremental adaptive structures

The first approach to spatial design consists of setting the essential initial "cohesive conditions" which can structure dynamic, open evolution. Designers can shape the robust physical structures which can foster and support the maximum dynamism and diversity, thereby preventing the system from developing extreme rigidity and efficiency or falling into chaos. This robust layer enables an open relationship between physical form and its social function, thus increasing the site-specific capacity of certain socio-spatial networks to co-evolve across time, to adapt to unpredictable activities, uses and needs of specific dwellers or to social, environmental, technological emergent transformations. In this respect, these cohesive spatial conditions render the socio-physical system responsive and able to adapt to unpredictable disturbances and unexpected situations, thus contributing to keeping the socio-spatial system robust, even though not pre-determined and in a constant state of becoming.

An example of such an adaptive structure concerns the incremental housing project built by Studio Elemental in Iquique (Chile) (Aravena and Jacobelli, 2012). The project is an innovative response to the challenges presented by a new policy from the Ministry of Housing and Urban Development, operating through the Housing Solidarity Fund. The beneficiaries of this social housing project were living in a central area of the city (where they had previously squatted) which was close to many job and education opportunities. The priority for the designers was to create a solution that allowed them to remain in this area, where they were already integrated in a good network of relationships. Since the site cost three times more than the amount that social housing could afford, the budget available for construction decreased dramatically. In order to avoid a reduction in the size of every single unit and in the quality of construction, Studio Elemental designed the new buildings as basic unfinished structures that could gradually be transformed by the residents, according to their individual needs. The structure alternates built segments with equally sized voids, the dimensions of which are designed to fit simple, low-tech construction (Fig. 1).

This building was designed so that the expansions occurred within the initial volume, thereby limiting the possibility for chaos without the need to control every single addition. The void could be filled by each family in a different way, also by re-using the elements saved during the demolition of the former informal settlement (doors, windows, fences, etc.). Studio Elemental (2012) defines this building as a 'diversity organizer': an incremental structure that encourages each dweller to play with heterogeneous spaces, surfaces, personal colours, textures and uses, according to ever-changing needs and possibilities (Fig. 2). From this perspective, the Elemental project can be considered as a robust structure capable of containing and rationalizing informal, diverse, unpredictable expansions without pre-defining the formal outcome of the transformation. In this case, a top-down design intervention triggers an incremental transformation which emerges from the individual actions and interactions of the dwellers. The uniformity of the initial structure fosters the diversity of the additions: here a traditional standardized building technique, usually associated with the monotonous landscape of social housing neighbourhoods, fostered the development of diverse expansions. The stability of the initial form supports the dynamism of the addition in time.

This design strategy gives great importance to coordination as it recognizes that the sum of individual performances, even though each of them is of a certain quality, does not necessarily guarantee the collective quality of the common good. The main role of the architects in Quinta Monroy was to provide those things that the individual interventions could hardly guarantee, such as safe structural frames, well-lit and properly ventilated rooms, and high-quality common spaces. The designers did what the inhabitants had been unable to do spontaneously: take care of the quality of the whole and coordinate the operations that required a collective sense (Aravena and Jacobelli, 2012). That is to say that designers were able to guarantee architecture of high quality, without over-controlling its spontaneous process of growth. In Quinta Monroy, the initial fixed structure is the collective cohesive layer which expands rather than limits the possibility for individual actions and channels them towards the collective interest.

Furthermore, not only did the Elemental team work with space and architectural elements, but it also included the action of the inhabitants in the design brief. In other words, the designers and the residents were seen as integral parts of the spatial transformation, rather than as external subjects. The fact that the inhabitants became the owners of the houses and were directly involved into the construction process of their individual expansions had many relevant implications. Firstly, the owners increased their motivation to maximize the quality of the expansion; secondly, this process fostered a sense of belonging: all of the inhabitants preferred to stay and continue improving their homes instead of selling them, although the value of the houses doubled after their additions (Aravena and Jacobelli, 2012).

Finally, the experience in self-construction by the inhabitants was one of the main ingredients in the project, and this was crucial in reducing the building costs considerably. In this respect, the Elemental project succeeded in maximizing the use of public resources to create a value (economic and social) far greater than the sum of its parts: the equation $7,500 (public investment) + $750 (family investment) = $20,000 was firmly based on the location within the city (Aravena and Jacobelli, 2012).

Figure 1. Elemental: Quinta Monroy: basic structure. Courtesy Elemental

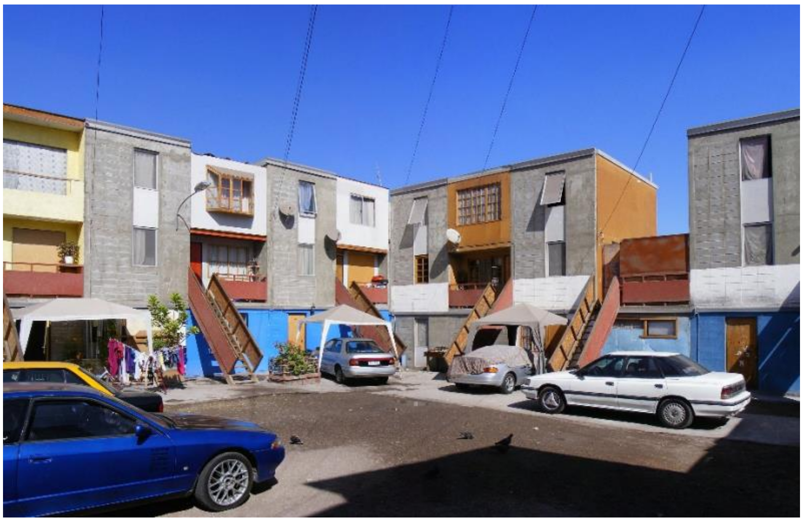

Figure 2. Elemental: Quinta Monroy: incremental transformation. Courtesy Elemental

Design as a good perturbation

The second possible approach to spatial design consists of intervening in current adaptive cycles in order to restore the balance between uniformity and diversity whenever a social-spatial network risks becoming too rigid and efficient and losing its diversity and redundancy (late conservation phase), or when it misses the minimum cohesive conditions necessary to avoid falling into chaos. In spatial terms, these interventions can materialize in a myriad of ways which aim to increase the cohesive conditions or to reduce some constraints across site specific social-spatial networks. For example, a design action might strengthen or insert a robust spatial structure when the system lacks a cohesive layer, or rather it could undo some constraints, for example by adding new, *a posteriori* undetermined spaces (open structures) to an overdetermined rigid structure. In both cases, designers intentionally influence an adaptive cycle, in order to prevent a late conservation phase or a release phase or, in other words, in order to restore the balance between uniformity and diversity, if the system had already fallen into one of these phases. Such an approach is based on a place-specific understanding of complex adaptive cycles across scales. This understanding makes it possible to identify the most appropriate type and scale of (minimum) intervention which can foster or restore the system's adaptive capacity, and thus its power to self-regenerate and self-produce the solution to emergent problems.

An example of this design approach is the famous Integrated Urban Plan (PUI), a complex program of city transformation promoted by Medellin municipal government and coordinated by Alejandro Echeverri (Echeverri and Orsini, 2010), where a series of punctual interventions triggered an incremental cycle of self-regeneration across the informal settlements which were involved in a dramatic process of decline. In Medellin, an understanding of social-spatial dynamics across scales revealed that, besides all the well-known problems related to extreme poverty, crime and violence, the informal settlements also own a peculiar and vital network of micro-connectivity that creatively supports social and economic exchanges on a local scale (Davila, 2013; Porqueddu, 2018). Nonetheless this intricate informal network grew excessively across the steep terrain of the mountains, thus preventing efficient connections with the rest of the city on a macro-scale. In this respect, the Metrocable project is the creative solution that makes it possible to reconnect and reintegrate the poorer areas of Medellin with the rest of the city through selective intrusion into their social systems, and thus with minimal damage to their existing labyrinthine structures. Building new streets to accommodate buses would have meant demolishing a large number of dwellings, thereby harming the vital intricate network. Furthermore, the Metrocable required little in terms of land acquisition and could be built over a relatively short period of time, thus considerably reducing economic costs (Brand and Davila 2011). Not only that, a bus network would not have been the most suitable solution for these settlements, as they are spread across the steep terrain of the mountains.

Furthermore, in Medellin, a social-spatial understanding led the design team to identify the strategic position for the Metrocable stations, which became focal points for the areas towards which the majority of residents move. By improving the spatial connectivity, the Metrocable affects local movement patterns, which consequently affect commercial patterns. These new focal points have also become reliable locations for positioning commerce, both formal and informal (Goodship, 2015), thus fostering an incremental upgrade of these areas, which used to be centres of extreme violence and crime. In this respect, the construction of the Metrocable network brought a new energy to the urban economies in its area of influence (Coupé and Cardona, 2013).

A new macro-scale connection traced from the top down triggered an incremental process of regeneration at the micro-scale of the intricate lanes of the informal settlements. In this perspective, the Metrocable project shows how social-spatial analysis enables designers to frame the most appropriate type of (minimum) intervention that can influence rather than determine individual movements and actions across urban space, thus activating a process of incremental change and self-regeneration.

On the one hand, the Metrocable enables the inhabitants of these settlements to easily reach the metro system and go to work downtown. On the other, the Metrocable offers a kinaesthetic experience across the stunning panoramic view of the whole city, thus turning the image of these settlements as places that are dangerous and segregated, into that of ones that are attractive and interconnected (Fig. 3). In this respect, the Metrocable also nourishes awareness of the potential beauty of these districts, thus stimulating trust in the communities inhabiting them and attracting new visitors who can also contribute to fostering the local economy and increasing diversity. Because of its strong visual impact, the Metrocable also became a symbol of inclusion. Conventional road and bus systems may have the capacity to move a higher volume of passengers, but they do not have the visual and aesthetic appeal and symbolic power of the aerial cable cars (Brand, 2013).

The Metrocable was just one of the components of the incremental process of urban improvement. This process was also triggered by complementary projects. A variety of new cultural spaces and sports facilities were clustered in the areas around the stations, which became hubs that could partially compensate for the notable lack of such services in these settlements. The new supralocal attractions were scattered across the local urban fabric, thus stimulating the emergence of a new distributed network of exchanges with the rest of the city. Moreover, the PUI developed a series of micro interventions, such as the construction of small plazas along the existing informal lanes, designed to upgrade the local informal micro-network of connections (Fig. 4).

The PUI in Medellin did not consist of a big redevelopment project where everything was redesigned from micro to macro scale. Instead, it produced a series of heterogeneous projects at different scales, scattered across and interwoven with the informal urban fabric, rather than being concentrated in a predefined area (Fig. 5). High-quality infrastructures, stunning examples of architecture, and local micro-interventions were distributed at discontinuous strategic points and treated as components of a complex integrated urban strategy, rather than as separate projects. This ability to go beyond individual interventions without producing overall plans created the conditions for an incremental spontaneous area improvement. These punctual projects stimulated and influenced cross-scale effects, thereby inverting a cycle of decline. In this respect, the Metrocable project enhances the slow micro-connectivity by building new, wide-scale fast connections. Vice versa, the coordinated assemblage of punctual micro-interventions across the intricate lanes triggers an incremental process of self-regeneration which extends on a macro-scale, far beyond the scale of every specific project site.

Finally, in Medellin designers and planners do not replace large parts of the existing informal urban fabric with a new formal overall order designed from the top down. Instead, their formal top-down actions trigger spontaneous processes of bottom-up self-regeneration across the existing urban fabric. In this respect, the PUI can be framed as a minimum new robust structure capable of fostering the vitality and dynamism of the informal settlement while preventing it from falling into chaos: the new structured macro-network of public spaces and oriented fast connections increased the efficiency of the system without reducing its micro-scale redundancy, which is crucial to its vitality and resilience.

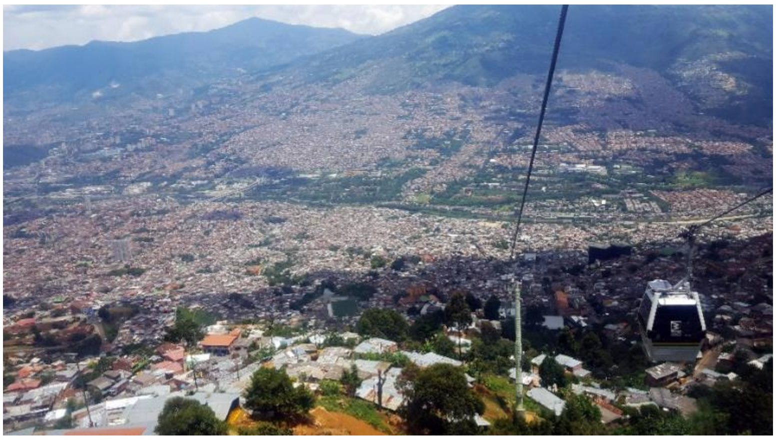

Figure 3. Medellin Metrocable: Panoramic view from a cabin. Photo © Camilo Montes Gutierrez.

Figure 4. Medellin. PUI Northwest Area: improvement of informal lanes. (Materials from EDU re-assembled by the author). Source: EDU, 2004 (graphic team EDU – urbam EAFIT). Courtesy Juan David Hernandez.

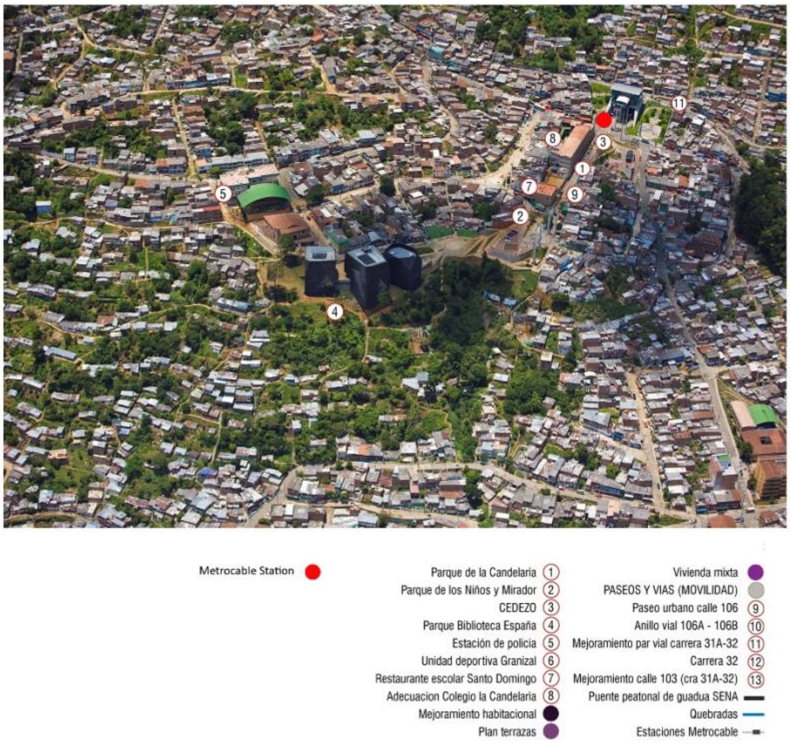

Figure 5. Medellin. Projects around Santo Domingo Metrocable station (PUI Northwest Area). Photo © Carlos Tobòn. Numbers and captions inserted by the author.

Towards a systemic approach to spatial design

The present paper highlights how, by understanding complex adaptive cycles across scales, designers can acquire the ability to identify the minimum top-down actions which can contribute to triggering a spontaneous process of self-regeneration that emerges from the bottom up. By recognizing that they do not have the power of control over emergent self-organizing orders, designers can acquire the 'Butterfly' power of subtle influence (Irwin, 2014).

In this respect, the design action can be framed as a good perturbation: designers modify or insert the minimum physical elements which can repair or increase the system's ability to self-regulate, self-adjust, self-organize in new better social-spatial fits (which can neither be predicted nor predetermined). In this perspective, designers become capable of shaping the minimal spatial interventions which can guarantee that the system preserves or recovers its adaptive capacity and remains in a state of becoming (vital, learning, in evolution). CAS theory shows that the adaptive capacity and responsiveness of a complex socio-spatial system, such as a city, decreases when there is either an excess or a complete luck of uniformity or structure. For this reason, the main role of spatial designers becomes either that of strengthening or inserting a robust spatial structure when the system lacks a cohesive layer, or that of undoing some constraints in overdetermined rigid structures.

The theories presented lead to developing a spatial design approach which shifts the focus from the final shape of the artifacts toward the non-linear (and cross-scale) effects triggered by their insertion in site-specific adaptive cycles. In this perspective, designers keep acting on physical form, although form it is not the goal, but rather it becomes a means to (re)activate the connections which foster/restore the capacity of a certain spatial network to learn, adapt, evolve, and renew. For example, the social housing settlement in Iquique is undetermined and unfinished, but it does not lack form: its shape is defined from the top down, even though it is conceived to be constantly transformed, adjusted, and incremented, from the bottom up. The stunning architecture in Medellin consists of very iconic buildings whose form and position are top-down defined, even though they were conceived in order to upgrade the existing informal lanes, in which they are immersed.

In this respect, both presented projects highlight how aesthetic quality can also be crucial in enhancing the process of self-regeneration, as it works on an emotional symbolic level. In Iquique the interesting and colourful landscape that emerged from the self-construction process nourished a sense of belonging among the inhabitants and increased their motivation to keep upgrading their house. In Medellin, the beautiful panoramic experience of the Metrocable and the new stunning architecture contribute to shaping a new positive perception of the informal settlements, thereby accelerating their process of self-regeneration.

The design strategies presented show how, by truly understanding cities as complex adaptive systems, designers can stop designing overall projects where everything is predetermined from the top-down from micro to macro scale. Instead, they can acquire the ability to:

1. play with cross-scale effects; they can stimulate incremental change through progressive site-specific micro-interventions placed at strategic points and at the right time in cycles of regeneration/decline.

2. design the site-specific essential robust physical conditions which can structure an open non-linear evolution over time without predetermining its outcome.

As illustrated by the projects presented, such a systemic approach to spatial design succeeds in minimizing social and economic costs, an aspect which is particularly relevant in a period characterized by extremely limited economic resources.

Finally, the present paper highlights the urgency for spatial designers to explore the complexity that lies between order and chaos, uniformity and diversity, stability and dynamism, and between individual expression and collective interest. Such understanding can inform a systemic approach to spatial design theory and practice, enabling designers to proactively cooperate with complex adaptive cycles of self-regeneration and decline in cities thus opening up new unforeseen possibilities for the heterogeneous landscapes of our everyday life and their emergent state of becoming.

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