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Design logics for relations: A methodology of mapping-and-designing (in) the city as open complex system

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Abstract

The city, beyond its physicality, is an open dynamic complex system, composed of relations among heterogeneous things. Questioning analysis and design in the city through this point of view, the paper presents an under-construction methodology of a generative mapping which negotiates logics of designing. The methodology develops through three levels of actions: 1. data gathering, 2. investigation of relations among data; 3. tests the methodology through case-studies. The paper examines the methodology through the combination of two tests, the public space of Athens center and in a park (Pedion Areos). Through this exploration, the paper concentrates on how such a relational-thinking methodology affects design logics by the following capacities: generative analysis; simultaneous decompositions and re-compositions of (new) relations in the city; defining and proposing relational fields for strategic interventions; augmenting the physical dimension; a briefing and decision making oriented design. Broadly, this methodology permits an intentional triggering, emergence and abstracting of complexity/ies.

Keywords: methodology of urban design, methodology of relational design, generative analysis, relational territorialities, relationally generated complexity

1. Introduction

The city is an open complex system, composed by dynamic relations among heterogeneous things: things defined by diverse (both material and immaterial) parameters (i.e. subjects, meanings, socio-economic conditions, information). These relations are generative, when they become interactions

and intra-actions¹: this way, new relations emerge. Therefore, the city as an open system with a interdependent dynamic ‘environment’ is under constant change.

The paper approaches city’s complexity attached to its relationality process. It presents a phase of the author’s ongoing PhD² research, which focuses on the construction of a methodology of describing and designing things from a relational-thinking point of view. The methodology is developed through the dialogue of a theoretical and a practice-oriented part: its logic evolves through testing applications. The paper looks at the research by examining how two testing case-studies in the city give feedback to the methodology and to its aims towards potential applications into design processes.

The paper’s outline: after this introductory part, central points of the framework are added. Next, the methodology’s scheme is described, while its capacities through the testing case-studies begin to unfold. The paper closes by discussing how these capacities can be translated from the specific level of the case-studies into more generalised perspectives towards logic(s) of relational urban design.

2. Framework

2.1. Conceptual – Theoretical framework

Central idea is the condition of relationality: relations are prerequisites of complexity. This argument is founded on Batty’s (2013) focus on the dynamics and especially on the behaviour of the interactions’ parameters of a system. These interactions, as supported by Cilliers (1998) too, evolve non-linearly, simultaneously and in different scales. They are observable depending on the relations among the system, the environment and the observer’s intentional actions. Thrift (1999) highlights the spatial-and-temporal substance of complex systems as well as the combination of qualities-and-quantities.

Space and place constitute conditions perceived accordingly as emergent situations in time, through intra-actions’ processes: intra-actions include subjects-and-objects, which are mutually composed following broadly theories that deny object-subject dichotomy (i.e. Barad 2007, Thrift 1999). Place conceived as a specified, by attributed meanings, field in time. The meanings are given through semiosis actions. Semiosis is comprehended in terms of the triadic relational model of C. S. Peirce (1931): a sign/ semiosis is composed by the relations of three terms. The first is a representation

¹ ‘Intra-action’ (Barad 2007) refers to cases of interaction where its elements emerge and are mutually composed through their interaction: “the neo-logism intra-action signifies the mutual constitution of entangled agencies” (Barad 2007: 33).

² The PhD entitled “The Relationally Composed Object: Description and Design” is supported by a scholarship from the General Secretariat for Research and Technology (GSRT) and the Hellenic Foundation for Research and Innovation (HFRI).

(representamen) of a second term (referent/ object) to which this is referred in a way that becomes capable to define a third term, the interpretant. This process of generating third term(s) is potentially infinite; a point enforcing the openness of the semantic level of a system and at the same time integrating memory and organic transformability.

2.2 Research

The research is fed by the question of how analysis and design in the city can integrate the conditions of relationality - complexity and constant changing. The research hypothesis responds to this question by setting mapping as a key starting point. Mapping, as an action of broader analysis, is a process, that can be both analytical and generative (Corner 1999). Mapping refers to the whole process of signifying actions producing any kind of recorded description of a thing. It is intentional and made by a specific subject within a specific context.

Great attention is given to the parameter of the subject. The subject-object mutual emergence through intra-actions integrates the relation between an open complex system and its environment, referring to its boundaries. Cilliers (2001) notes that boundaries don't "limit possibilities", they are "enabling constraints". Setting boundaries is analogous to framing: a system is framed during its description in a specific way and for a particular reason by its subject. Furthermore, the diversity of subjects amplifies the semantic spectrum of the system, triggering more potentialities of interactions. This inter-subjectivity triggers an inter-objectivity, which through intra-actions becomes a complex of intra-object/subjectivity, involving agency.

The object of research concentrates on the construction of a methodology for describing and designing in complex relational fields, such as the city. The methodology is expected to be developed into a digital tool (i.e. software - digital application) in the future. Current aim of the methodology's capacities is to create a 'tool' - way of a generative analysis linked to design actions; a tool capable of analysing an object (i.e. city) in regard to its parameters of relationality. This kind of analysis enables to decompose and recompose an object and, thus, multiple new re-organisations of it. The generative aspect is not promoted towards a direction of an increasing complexity. It aims at revealing it, at understanding, exploring it and at the same time to managing it through abstractions, always depending on its intentionally shaped context.

2.3 Relations with the scientific community

Theories and research practices closely related to the methodology developed are Space Syntax as well as the theory and the work of Michael Batty, both linked to the broader thought of Christopher Alexander. Space Syntax is a methodology for analysing space through its relations with social life, but it does this in the material field, without integrating the sphere of the different meanings (Hillier and Hanson 1984). The current methodology prioritizes the semantic-generated interactions and their relations with territoriality. This difference cultivates an opportunity of complementarity: in next research phases synergies between the two approaches could be investigated, in order to

strengthen the actions of evaluating design decisions for material interventions. The same applies with Batty's (2007, 2013) models, but differently. Adapting the semantic data to his models and comparing them with the current enhances the evaluation of the design decisions through comparisons. Regarding digital maps and platforms (i.e. Google Maps, G.I.S) they offer spatial information: on the one side, there is the spatial information and on the other, there are desires, intentions and agencies, manifested through different actions, such as discourse. The role of the methodology lies in-between these fields: it relates them, enabling the expression of their negotiations and interactions. Its value is the translation of these expressions into design proposals.

3. Description of the methodology

3.1 Methodology's logic scheme & Visualisation into an Interactive Open Map

The methodology is composed of three levels of actions.

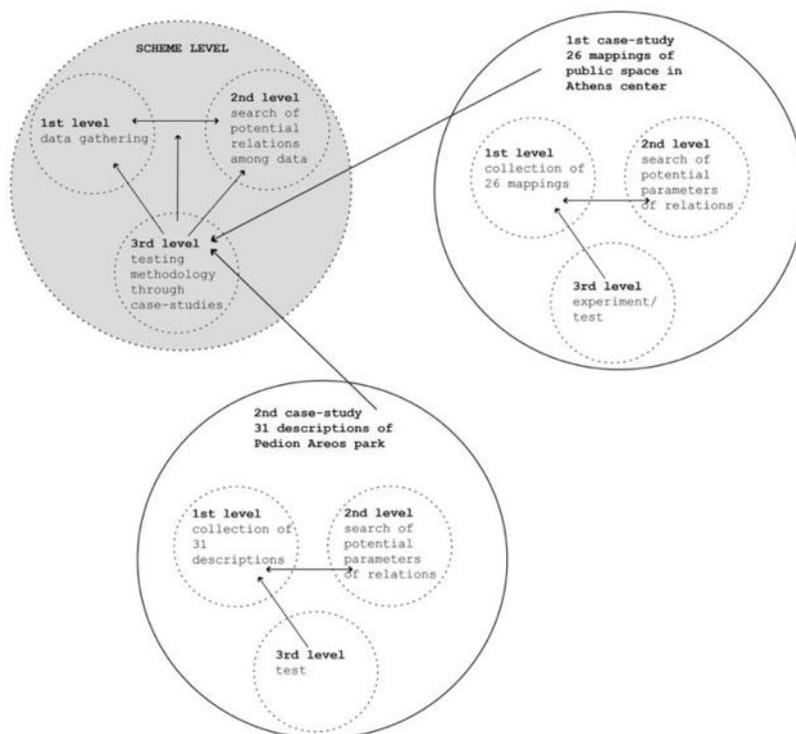


Figure 1. Methodology's scheme, integrating the testing case-studies' contribution.

In the first, data are gathered: mappings or descriptions of the city, made by different subjects, following a sampling logic under the criterion of achieving heterogeneity. The second level concerns the data organisation, in order to define communication parameters among them. Communication refers to relations, potential interactions and intra-actions. This way, the system becomes open to

new connections; hence, to the emergence of new meanings or broadly new information. These expand, densify and “complexify” its semantic networks, affecting other sub-systems. In the third level, the methodology is tested through different case-studies: the current paper assesses the methodology through a combinatory consideration of the selected two tests. Inspired by the spirit of the research by design and the attitude of system-thinking, this level is crucial. It enables back-and-forth transitions between generalisations and specifications. It makes the logic adaptable to different processes and contexts. It keeps the scheme open to feedback loops.

The organisation of the data and their relations can be visualised through an “Interactive Open Map” (IOM)³, composed of the system of a data-base, a table and a map (figure 2).

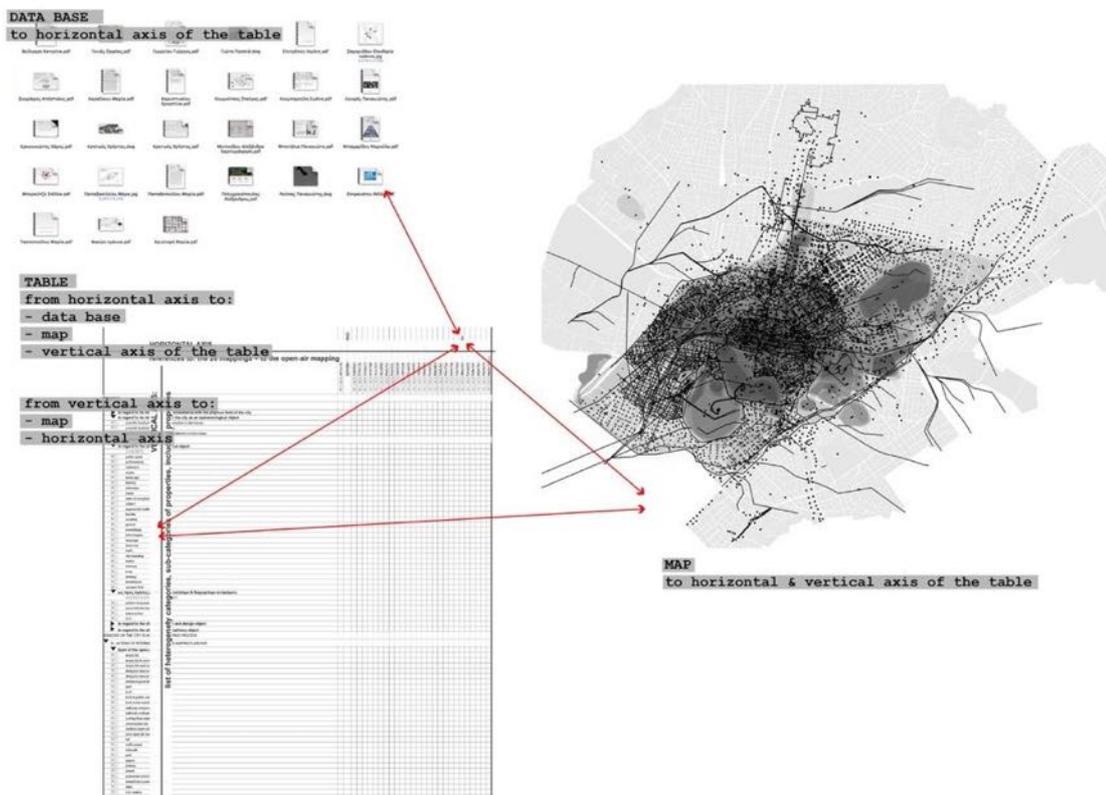


Figure 2. Selection options in IOM.

The data-base contains the mappings - descriptions in their original form. The horizontal axis of the table integrates references to the gathered data and the vertical axis the properties list as organised in categories. The organization and the classification of properties, depends on the logic of city’s parametrization set by its context. What is significant is the existence of such a list/ table: the parameters and their potential relations define the networks that can be created and revealed beyond the physical connections. On the map, the references to physical locations are codified and

³ In the current phase of the research this is developed in a level of describing how it might operate. No software is used. The codification, the noting of the data, the formation of the maps and the tables is done manually.

noted: each dot corresponds to a reference to a specific location, each line to paths and the irregular schemes to abstract references to areas. In IOM, the data-base, the table and the map are interconnected through options of selections (red lines in figure 2).

The map-table relations are central, being inspired by the logic of the diagram and this of the abstract machine, as introduced by Deleuze and Guattari (1988). The diagram sets a base for a logic capable of organising and triggering the emergence of “new realities”. As Stan Allen (1999) puts it, a diagram is a “description of potential relationships among elements, not only an abstract model of the way things behave in the world, but a map of possible worlds”. The selections made between the map and the table are capable of creating maps of possible worlds, multiplying and densifying the city.

3.2 The methodology through the case-studies

The first case-study is an experiment of 26 mappings of public space in Athens center, carried out in the context of a postgraduate course in 2015: each subject was asked to map public space in regard to its research interests. Mappings’ subjects have converging backgrounds in terms of scientific discipline, but due to this the heterogeneity of the mappings’ properties appears wider, in regard their methodologies.

Although the parameters’ list is something decided according each process intentions, in order to proceed to the test, a scenario was built: every mapping is a semiosis process that is framed by its subject and whatever frames it, but which also frames the city. Two general interdependent properties’ categories resulted from this (figure 3).



Figure 3. Properties classification for the first case-study.

In figure 4, some of the mappings of the first case are shown in their original form. In figure 5, each map presents the references of each mapping to the city in a codified form. In the map of figure 6, the 26 mappings appear overlapped.



Figure 4. Sample of the 26 mappings in their original form.

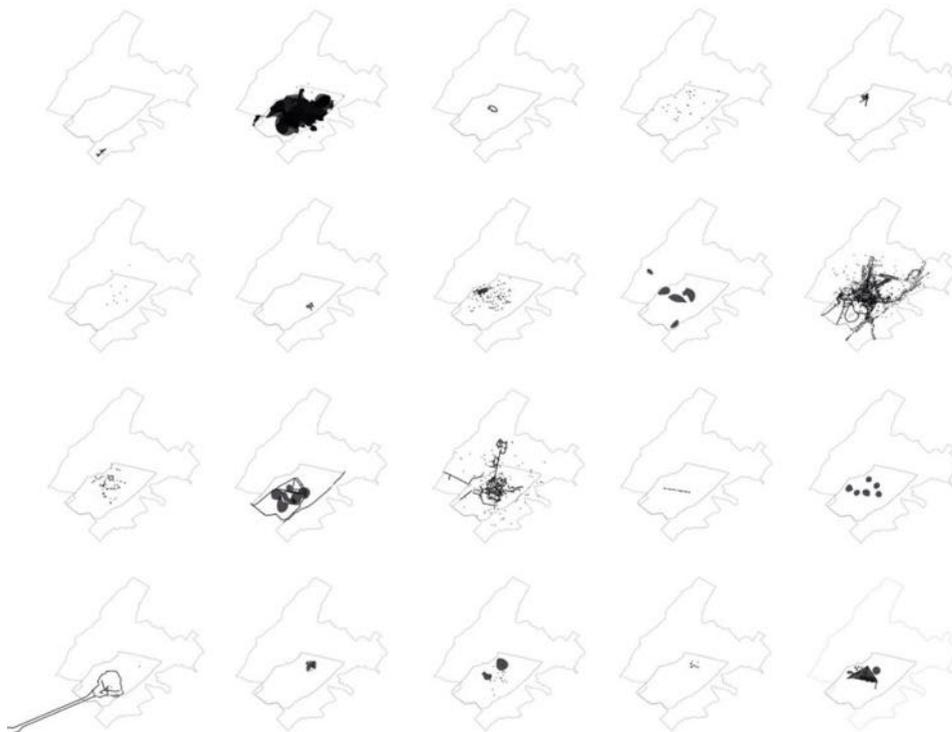


Figure 5. The codified 26 mappings. Outer shape is Attica and inner the area of the initial base-map.



Figure 6. The 26 mappings overlapping.

The second case-study, is more recent and ongoing test. The descriptions gathered cover (in a sampling logic) a wider timespan and subjects' diversity, which corresponds to different stakeholders.

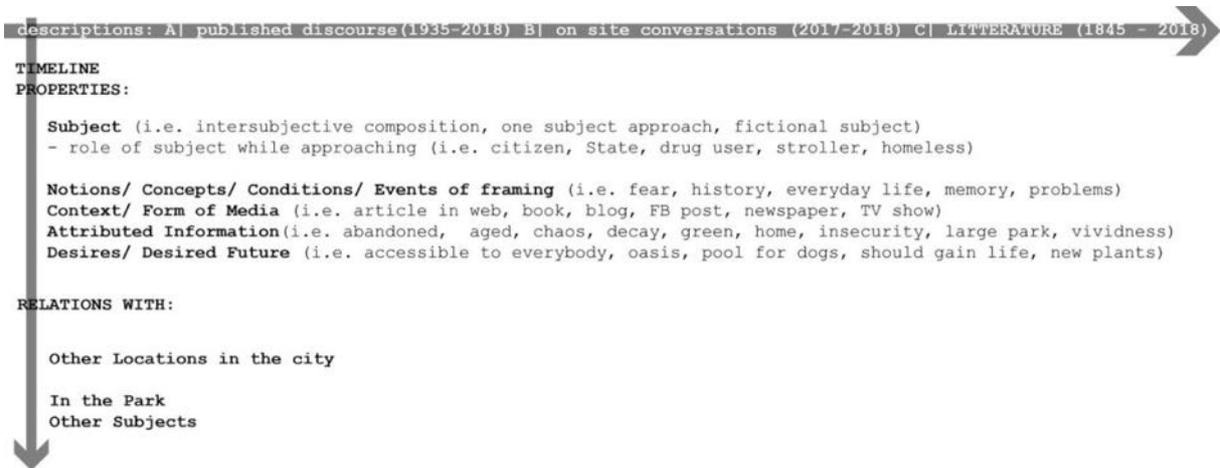


Figure 7. The scheme of the main parameters for the organisation of the 31 descriptions into a table.

The extraction of properties focuses on the conceptual and semiotic parameters that can reveal new relational-generated geographies of the park and the complexity triggered by the information created through discourse actions. References to other locations or other subjects are part of the parametrisation, in order to enhance the inter-subjective relations that form it and the systemic approach of the park as integral part of a system.

Another difference is the different scales of the cases: the scale of the first is a large area of Athens center, while the second concentrates on a park. These are different scales of complexity, which challenge the methodology on how it deals with the transitions between them.

3.2.1 Athens center public space case-study

The selection of properties activates references on the map and, thus, implied relations among them. In figure 8, the property 'open editable file' is selected, so that the mappings having this property are highlighted and their references to the city are activated. This way, the spatial expression of one or more properties is revealed. Considering that through these actions all the relevant references to the city are getting connected, what one sees on the map is a potential network, that has been created through its interaction with the IOM. The value of such actions is not the creation of connections; but the capability of seeing how these interrelations, decompose and at the same time recompose the "city".

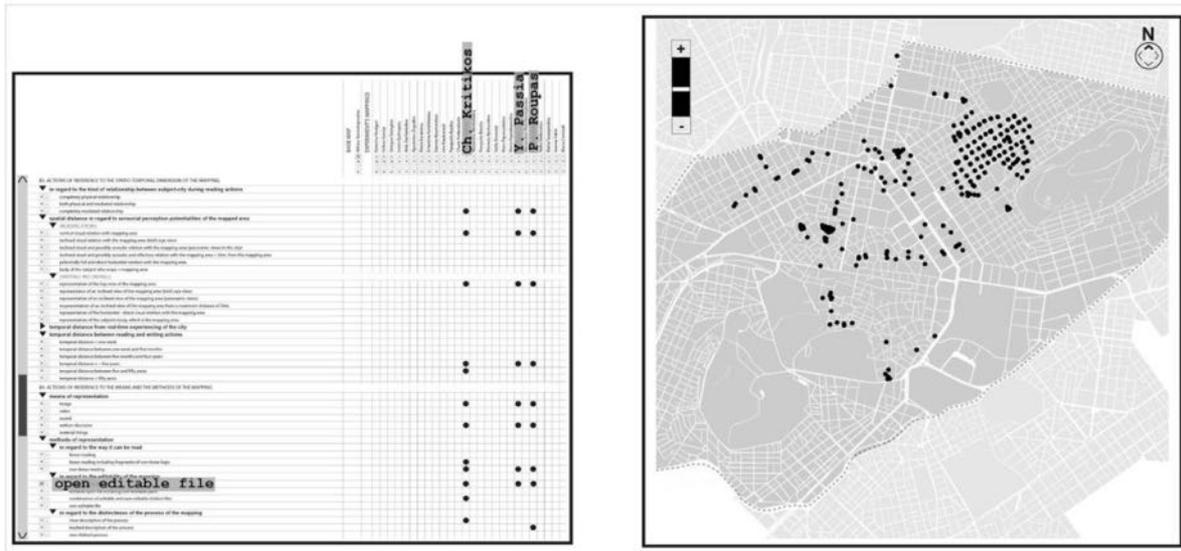


Figure 8. Sample snapshot of selection of a property in the vertical axis of the table, which indicates the mappings including this property and activates their references on the map.

In the figure 9, the location Syntagma square is selected and the mappings including reference to it and their properties are shown. This way, properties attached to any physical location can be detected on the map. From these options, it is shown how locations and information are related, but also how information affects the relations of locations, and vice versa: how relations of locations reveal relations of information.

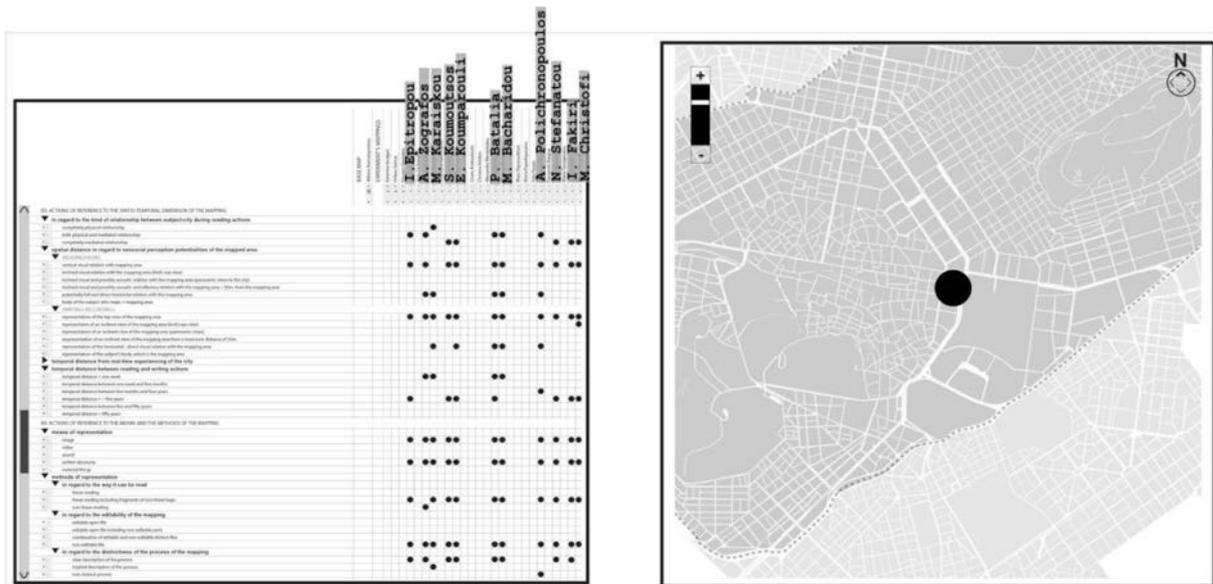


Figure 9. Sample snapshot of selecting a location on the map, which highlights the mappings including reference to it, along with their matched properties on the table.

3.2.2 Pedion Areas park case-study

The ‘node’ of a location, such as Syntagma square, can be further analysed. The second case, which is a park, can reveal it, as a zoom-in action. Every node/ dot on the map of the Athens center, is another network - system, revealing more details about its relational field. Every node incorporates further networks and vice versa. By zooming-out, every network looks like a ‘node’ and so on. Here, a perspective is opening: one can reveal but also combine simultaneously multiple networks and scales of complexities. The descriptions of the Pedion Areas were organized in a similar to the first case-study way, although the organization of properties is developed and adapted to the different type of gathered data.

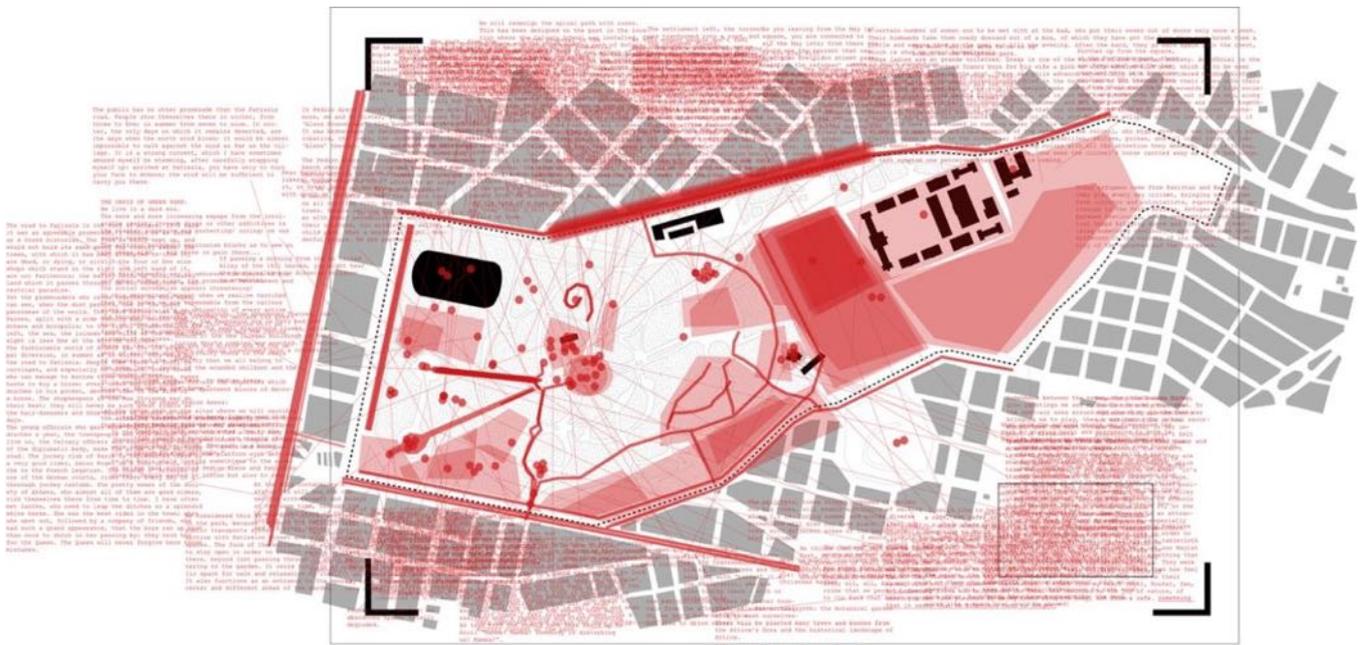


Figure 10. Map of all the references of the 31 descriptions to Pedion Areas.

4. Perspectives of design logics

The sequences of actions already presented show in very simple ways how this methodology becomes a tool of revealing and triggering multi-scalar complexities and making abstractions. This section explores how the aforementioned capacities of the methodology could be adapted and evolve, in order to discuss about design processes through the terms of relationality and complexity over the broader context of system-thinking.

4.1 Design as generative analysis

Firstly, the IOM can produce intentional urban design and strategy proposals attached to the analysis actions. This is linked to the aim of the methodology to promote a logic of a generative analysis of a thing. The analysis comes close to synthesis' actions in two ways. First, because it is selective and second, due to its generative capacities. Regarding the first one, the analysis of the city is based on its intra-subjective perception, as expressed through intentional actions of mapping and description. When dealing with conceptual and the semantic complexity, analysis is selective, through decisions related to which kind and which level and scale of complexity it activates or more simply it sees. It sets the frame in which further actions will take place. The parametrization actions in both case-studies function as this process of intentional selections.

The methodology, but also the IOM, by embedding the diagrammatic logic of Deleuze and Guattari (1988), make analysis generative, by connecting it with synthesis actions. Through the interaction of the data, new information about relations reveal. This is a kind of what Deleuze and Guattari mention as a "new reality". Actions among the levels of the methodology's scheme as well as actions among the components of the system of IOM are non-linear; especially in the latter, a back-and-forth movement is encouraged. Through both ways, one can de-assemble and re-assemble the city; thus, create multiple new re-organisations of it, as set in the aims of the methodology.

Therefore, either by selecting parameters or by non-linear decomposing and recomposing of relations, design can be perceived as the design of the framework through which new relations or new realities may emerge. This is the design of the rules and the parameters for the emergence of a relational field.

4.2 Design as defining & proposing relational fields for strategic interventions

Through actions in the IOM, one can detect, define and propose, locations, areas or networks for further interventions. Definition and proposal is not limited to the locations and the limits of the intervention(s) field, but it also integrates the terms, the briefing, since relationality is connected with the territoriality. Such terms could be the concepts and the meanings, intentions, other properties or even the relations with other locations. Therefore, this is a logic of promoting an approach of a relational territoriality, where design assembles physical and non-physical relations as a system. The field is approached along with the information and the memory it carries, depending the selections made by whoever manages the IOM.



Figure 11. Map of all the references of the 26 mappings in Athens center.

For instance, in the map of figure 11 the references are denser in this area around the Syntagma square. The intensity of density can be linked to a hierarchy that a location or a node has in the context of the system it is approached. In this density and hierarchy, the connections of a node with other locations should be also considered, since hierarchies have to do with communication routes (Cilliers 2001). Here, hierarchy is not taken for-granted or static; it is transformable (Cilliers 2001), revealed within its approach context and the selections causing it. This density and hierarchy is in coexistence and potential relation with other densities and hierarchies, evoking the thinking of overlapping hierarchies (Batty 2018; Alexander 1965).

Observing the density on the map is not enough to understand the described hierarchy. By making the respective selections on the table, one can go deeper on the parameters and the reasons leading to this result. Second, a zoom-in into the Syntagma square, would unveil further networks and relations as well as more information about overlapping behavior.

directly to it, but to its relations and its effects to the whole system that it is part of. This logic is also close to the idea of a more strategic form of design, which gives emphasis on the effects of the decisions and their actualisation as well as on the processes of the interactions that are estimated to cause the intended result. Therefore, this perspective of designing focuses in a more intense way on the design of processes, which share features with the logic of the acupuncture.

4.4 Briefing, decision and abstraction making oriented design

By making different selections, going back-and-forth the map and the table, one can zoom-in the Syntagma square and proceed to a more concrete proposal by setting intentionally hierarchies on information of the table in order to control what it can be seen on the map. For instance a scenario towards a proposal for the Syntagma square in regard to the combination of the concepts of the commons and of the Otherness: among the 11 mappings that refer to it, only 3 of them do it through these two concepts. Thus, in figure 13, it is abstracted which mappings and, thus, networks refer to the Syntagma square in regard to these two concepts. Additionally, one can detect on the map other areas of encounters among the different networks and at the same time complementary or conflicting properties on the table.

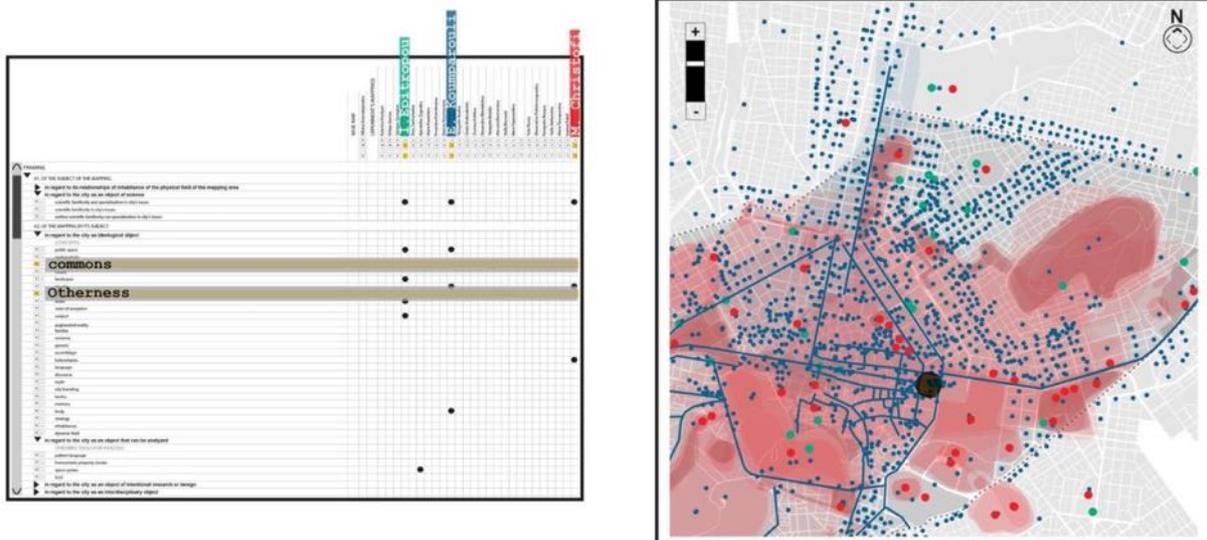


Figure 13. Sample snapshot of making abstractions.

This can be done through extra sequences of actions in IOM. In this perspective, the briefing begins with a specific ‘node’ and two concepts. It can proceed to more abstractions by being more selective on the information shown on the map and the table.

4.5 Design as classifying relations as forces

Similar actions can be applied in the Pedion Areos park. By clicking to the property “problems” (figure 14), it becomes clearer that the red networks (figure 15) are composed of diverse types of networks

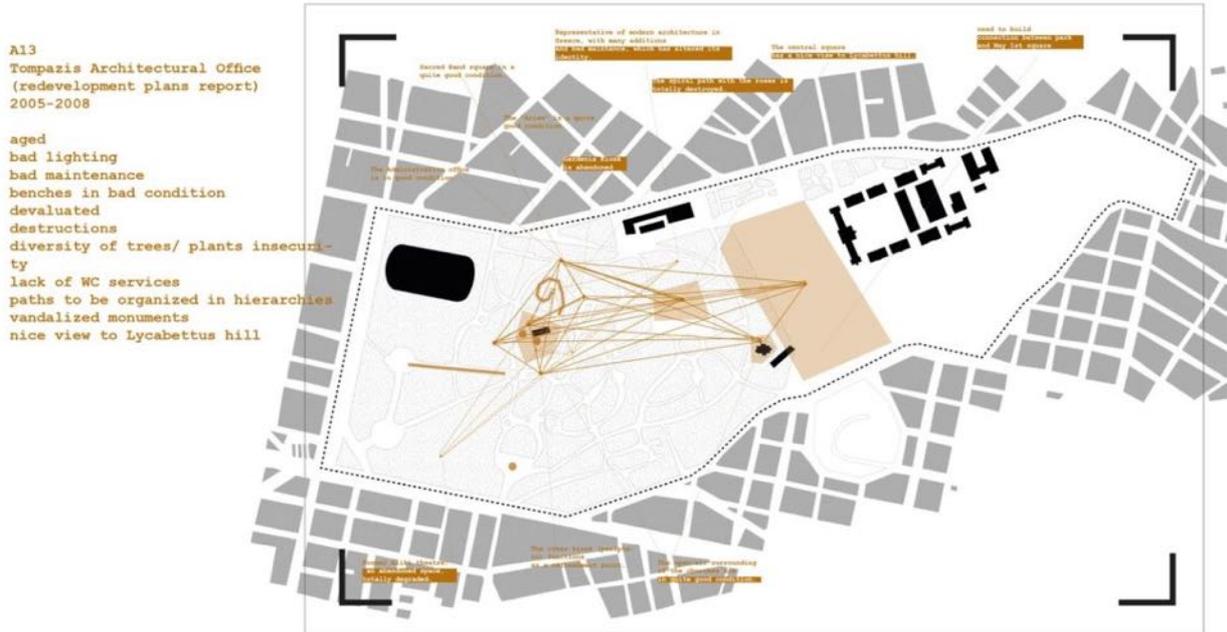


Figure 18. References of the description A1.

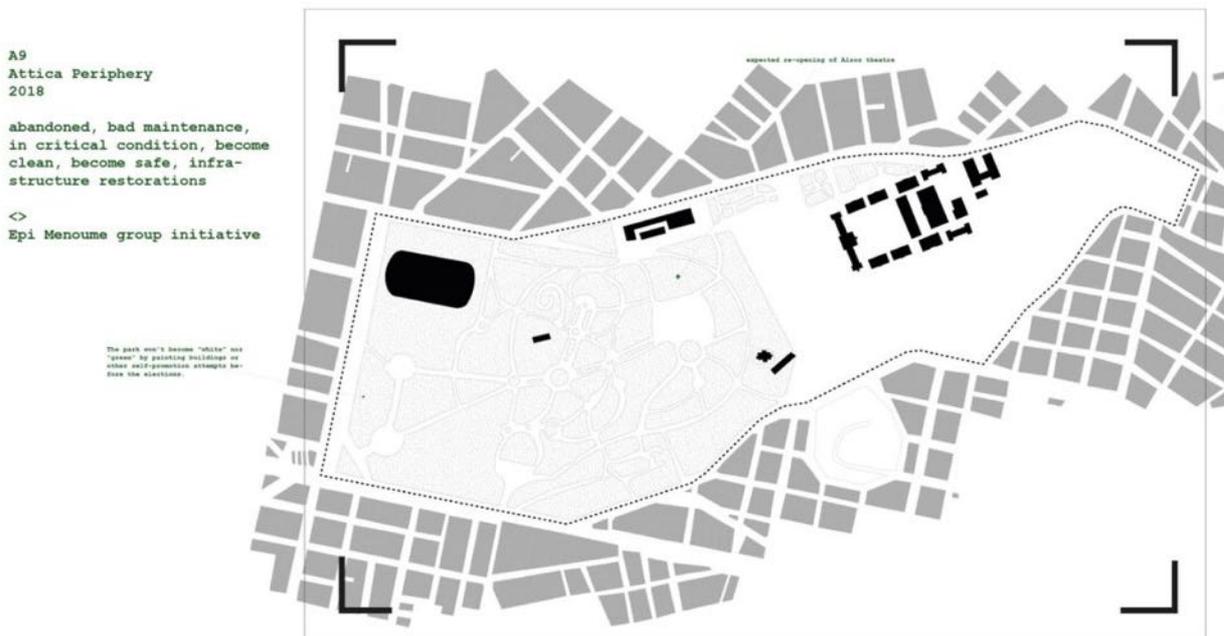


Figure 19. References of the description A9.

Through this step, more perspectives of back-and-forth actions among relationality and territoriality are opened. Additionally, one can go deeper on the issue of the park's "problems" by activating further information, as the properties noted on the left of every map. These by implying or mentioning problems related to them (accessible through the table) enrich the description of the problems of the park, contributing to more targeted proposals.

In figure 20, the overlapping of the diverse networks is depicted. The chronological sequence of their positioning before or their overlapping reveals how this field of forces changes: it changes in regard to the different point of view, to different intentions and agencies.

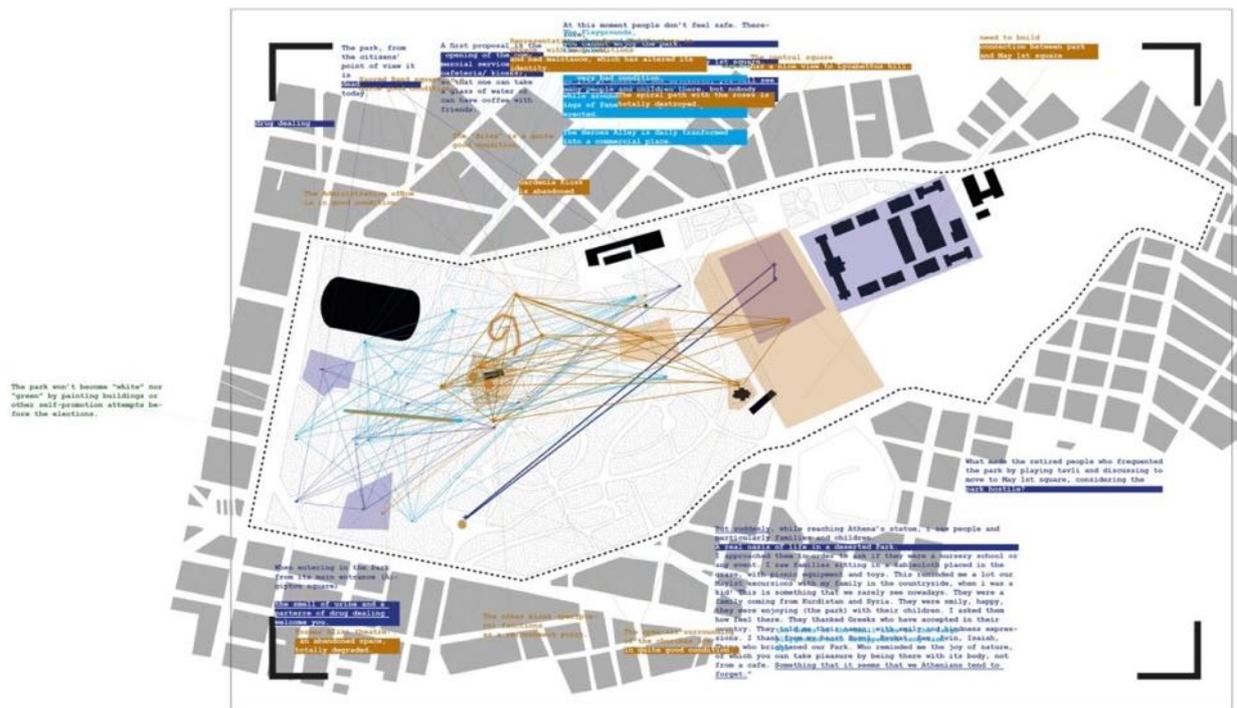


Figure 20. Overlapping of the 4 (or 8) different networks of forces.

5. Conclusion

The comparative consideration of the two cases contributed to the maturation and the enrichment of the transitions from data to design. At the same time, the whole process of comparing presented in this paper put under rethinking the first testing case-study - and through it the methodology -, in terms of revisiting and reviewing it. The different scales of territories, relationalities and complexities is the main triggering reason, because it challenges the object of urban design and its relations with architectural design and urban planning. Such a negotiation can be tested through the larger scale of the first case-study. The next test is planned to focus on Syntagma square: which is not considered any more considered as a node, but a relational field overlapping with other relational fields. It is a case through which more back-and-forth as well as zoom-in and zoom-out experiments can be carried out. Another intention for the next test is to enlarge the timespan (in order to experiment with transformations in time) of the data as well as the subjects, which means that new data will be added. In this rethinking, the idea of attracting and repulsing forces shaping relational fields constitutes another significant idea to be integrated and further developed, since relations, interactions and potential intra-actions depend on them.

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