Urban Design and Physical Geography

Theoretical and design experiences of Italian architecture in the second half of XX century

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Abstract. The current large-scale expansion of modern cities and their progressive dispersion over a large territory reveal a critical moment in the relationship between natural and human environments.

This crisis could also provide a chance to ponder, and modern cities could benefit from the challenges brought by its structural, dimensional and spatial implications.

For this reason, the relationship between urban design and physical geography is the central core of the problems assumed by the research.

This paper analyses the work of some emblematic figures of Italian architectural culture in the late XX century; it is possible to spot a common denominator that brings together the different experiences of that period. They try to define the syntax of urban construction in relation to the orographic conformation.

The aim of the paper is to pinpoint the methods employed by these projects through the analysis of some case studies, in order to understand if they can be of use in contemporary urban projects.

Keywords. Urban design; physical geography; urban form; topography.

New territorial conditions: crisis and potentialities

"Before turning the support into column, the roof into gables, before putting stone upon stone, humans laid the stone on the ground to recognize the place in the middle of the unknown universe to measure it and transform it".
Vittorio Gregotti (1982).

The relationship between urban forms and geography has its roots in ancient times.

Rivers, bays, capes, hills, and lakes are geographic elements that always had a key role in defining urban rapports: from the site's foundation, to the structuring process of the urban form, and to the construction of the individual parts of the city.

Many settlements in the Mediterranean basin were born and developed due to the formal and spatial qualities inherent to the orographic conformation of the region.

The cities of Magna Grecia, in southern Italy, the medieval villages perched on the Apennine ridges and the renaissance cities of central Italy are a few examples of this blissful alliance between nature and architecture (Moccia, 2015). In these examples, the orographic configuration has an etymological significance in the forms of the city, because it plays an important pare in defining urban elements and spaces, their usage, size and function.

The beauty of these settlements lies in the ancient dialogue between nature and culture, expressed by forms, human signs on the ground, and by the presence of natural elements. The more this dialogue is harmonious, the more the landscape is loaded with aesthetic value.

This relationship has clearly changed over the last century and so have our territories.

Human settlements are expanded on larger geographical scales, and continue to do so often without real planning, in random patterns, “scattered” on territory (Arís, 2005).

This condition reveals a critical moment in the relationship between natural and human environments.

The word "crisis" may indicate a disturbance, the emergence of a state of alteration, but if it is understood in the etymological sense (*krino*: to separate, to discern, to evaluate), indicates a state of reflection, discernment, judgment. In this case, it implies the need to decipher new relationships and the rules of a new language that stimulates the dialogue between cities and territories, to search for a new harmony between anthropic and natural environments.

One of the main phenomena that characterize this crisis is the large size reached by contemporary settlements.

Additionally, more sudden shifts have occurred at structural level. The *city-territory*, in its discontinuous expansion, has embedded spaces of nature and it is now configured as a polycentric network of autonomous settlements, linked at the same time to an extensive territorial network.

The old “historical centre” has lost its ability to orient the expansion processes. Having lost the traditional continuity and subordination to the consolidated city, each part is now called to face the specificities of each territory more independently.

In this condition it is also possible to define a new dialogue between the continuum of the natural substrate and the urban fragments. The un-built voids assume a syntactic value, the value of the break in the composition: the interstices of nature (un-built spaces, edge-urban areas, fields, and voids produced by demolitions) become able to confer identity and autonomy to the individual parts, through defining them in their finiteness.

In addition to providing the background that makes it possible to configure the relations between the parties, these “empty” spaces naturally prone to appear in certain locations and to enter as active elements in the field of urban relations: mountains, hills, creeks, forests, rivers, natural elements with own shapes and characters. They make up the city like squares, roads, fabrics and monuments, and therefore lend themselves to be operable material for urban design (Gregotti, 1972).

The relationship with the territory: the discipline of urban design

At the beginning of the second half of the Twentieth Century, Italy was the birthplace of a theory of urban facts. Some categories and analytical-interpretive instruments were produced by this thought, which enables us to investigate the complex phenomenon of the city and to deal with its transformations thanks to the discipline of urban design.

These studies led to the birth of the Italian school of urban morphology and building typology, which was the core of a fervent debate involving urban questions.

The historical city was the main object of these analytical studies: the building typology, its repetition to conform the parts of the city, its variations and its stratifications allowed to identify some general rules of its construction.

At the end of the 60s, however, these theories turned out to be partially ineffectual if related to the destinies of the cities, which began to expand rapidly and to change their structural configuration. The cohesion between the most important figures of the Italian architectural debate became weaker and a deep crisis interrupted the continuity of these studies.

In Italy, in those years, the passage from the condition of the *European historical city* to the contemporary *city-territory* was beginning to be tangible.

In the twenty years following the crisis of the 60s, a new generation tried to draw close to the studies conducted by the discipline of urban design. Among these, in particular, the group that grew up around Aldo Rossi, Giorgio Grassi, Antonio Monestiroli, Agostino Renna and around the themes of the Architecture of the City.

The hypothesis of the research is that there is an important *leitmotiv*, never explored in depth, which binds the design experience of these two generations. This is based on the notion that both generations seem to recognize, although within a very complex and articulated framework, the theme of the relationship between the shapes of the ground and the shapes of the city as an essential element for urban planning.

Through the project's exercise, these architects tried to define the syntax of the city's construction in relation to the shapes of the orography by recognizing and enhancing the "features" and the topological characters of the natural substrate.

After acknowledging the paradigm shift that has transformed the structural meaning of the contemporary city, the aim of the research is to investigate the crisis and endurance of tools and categories developed by the type-morphological thought, with a view to find a new application within the urban and territorial conditions.

Re-drawing and interpretation of recognized paradigms: objectives and methods

The principal aim of the research is to investigate, through analytical drawings, the methods used by the authors in order to achieve the interpretative process of territories, and define the projects. In particular, the research focuses on some specific potential qualities inherent to the relationship between urban and territorial shapes, such as:

- The “conformity rapport“ between territorial and urban structures; i.e. the generative value natural forms acquire in relation to urban structures.
  In other words, the purpose is to investigate, within the design process, the interpretative methods through the settlement patterns for new urban interventions are defined, starting from the recognition of the spatial possibilities contained into the orographic structure (the formal relations between the elements of physical geography).
  Through interpretative drawings, it is possible to clarify the relationship between topography and arrangements, guidelines, shapes and dimensions of urban elements.
  The aim is to point out that, after the recognition of specific spatial qualities within the morphological structure of territory, it is possible to define the settlement principles in order to set the formal structure of the project.
  The “correspondence relationship” between geographical and urban elements and, within this rapport, the way through which building typologies can be renovated in relation to the shape of the ground, succeeding in creating different types of spaces.
  The aim is to point out that, after the recognition of the specific formal qualities of the elements of the physical geography, it is possible to define urban elements, which are able to modify their own spatial characters and their own typological structure in relation with the shape of the ground.

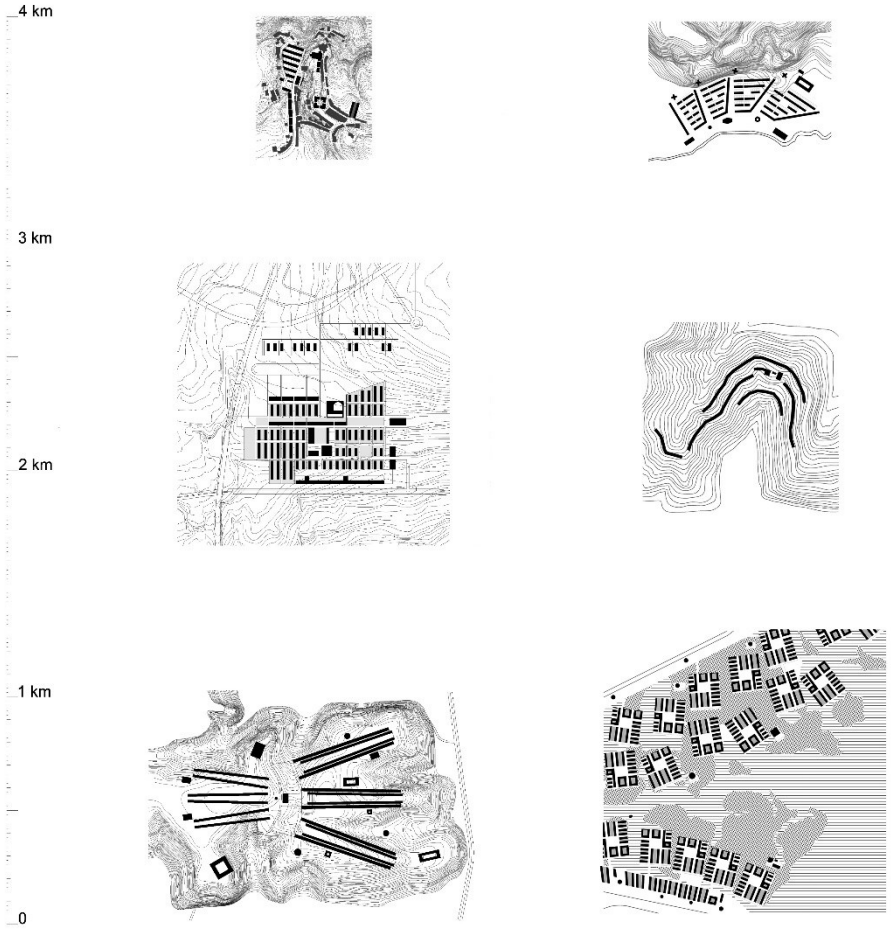

Figure 1
Dimensional comparison _ From the top, on the left, the projects for Teora and Monteruscello (A. Renna) and one of the projects for Magliana II (S. Muratori); on the right, Magliana I (S. Muratori), Forte Quezzi (L. C. Daneri) and Barene di San Giuliano, Estuario I (S. Muratori).

Saverio Muratori

Projects for Ina-Casa quarter, Magliana II. Rome

Saverio Muratori's 1957 projects for the expansion of the Ina-Casa Magliana district acquire a special relevance to this subject, both for the extreme precision with which he structures the relationship between the new borough and the territory of the Magliana hills, and for the experimental nature that the experience takes on: the wide range of versions developed during the design process clarifies the adopted method, the choice of the settlement principles, the definition of the measures, and the syntactical bonds between the elements.

In the hilly system that characterizes the project intervention area, we can recognize four distinct elements: the plateau at Northeast, the system of the three ridges at Southwest, the saddle between them, and the system of the "punctual" highland.

The composition of the urban structure in relation to the topography is the result of an interpretive process and, for this reason, there is not a univocal solution.

In all the project versions, Saverio Muratori uses the elongated shape of the three ridges to build long perspective roads through a process of "geometrisation" of the territorial shapes.

The part of the borough developed on the Northeast plateau is built through the identification of another geometric system that sometimes mirrors the first.

Muratori arranges the collective spaces, representative of public life and of the identity of the entire community, in substantial areas of the territory (the saddle between the hills and the "punctual" rounded uplands), because of their formal qualities, which are recognised as suitable for this purpose.

Figure 2
"Conformity rapports" between territorial and urban structures _ Projects for Ina-Casa quarter, Magliana II, Rome, 1957.

The saddle is the point of convergence of the streets positioned on the ridges, the focal point of the settlement. For this reason, according to the design assumptions, it becomes a public park or a large urban square.

The circular uplands, on the other hand, present themselves as relevant points of the territory, because of their "punctual" nature and of their height. Muratori choses them as sites for isolated public buildings, because they are easily identifiable at great distances and in turn provide panoramic views.

In some cases, Muratori builds the system of public buildings by identifying key positions in the formal structure of the hill system, in addition to uplands. In these points, he breaks the tissue and inserts gathering spaces and public buildings.

In addition to searching for structural bonds, Muratori articulates and shapes each of the individual urban elements (street, square, monument, urban fabric) in correlation with the geographic elements that constitute the topography of the site (hill ridge, plateau, uplands, hill saddle, valley, slope).

Within this dialectic, the elongated shape of the ridges corresponds to the long perspective roads that make the vast landscape of the Tiber river valley visible from inside the settlement (Palmieri, 2013). The saddle between the hills corresponds to a symmetrical semi-circular space (marked by an obelisk in its centre) in some drawings, while in others it is characterized by an upward trend (marked by the presence of public buildings in the highest point of the saddle). And, again, the slopes of the ridges correspond to the comb systems built by the repetition of courtyard buildings, which are orthogonal to the axis of the ridge and define their dimension in order to follow the shape of the contour lines.

The courtyard buildings are in some cases open and overlook the valleys, and in others they are closed and develop a strong inner character. The variation of the typologies has the purpose of exploring the different spatial qualities of residential buildings, which are defined in connection with the surrounding landscape.

Some other variations can be observed within the relationship between urban morphology and building typology. In some projects, the courtyard buildings are placed on basements and establish their relationship with the surrounding nature through the definition of a vantage watching point of the landscape, as a place for "looking at the nature". Other times, the buildings rest directly on the ground, and allow not only a visual, but also a deliberately spatial continuity. In this case, the space of the courtyard between the buildings is connoted by the presence of the vegetation, as a place for "walking in the nature".

Agostino Renna

Project for the recuperation of the historical center of Teora, with G. Grassi, Avellino, 1981

Teora is a small town castled on a rugged ridge in Irpinia, near the Ofanto river valley. An earthquake in 1980 completely destroyed the village, which had always been characterised by a compact form.

In an essay in Lotus Documents, Giorgio Grassi (1988) wrote: "After the earthquake and especially the demolition work and partial clearance of the rubble of the ancient centre, the ground was laid bare in what we might call its "natural" state, revealing just how close a correspondence existed between the buildings and the contours of the land, the extreme naturalness with which the one was adapted to the other […]."

The choice to rebuild Teora on the original site, which was allowed by the confirmations obtained from the map of seismic micro zoning and by geomorphological inspections, represents also the will to provide the future of the settlement with deep roots.

However, a third of the old town could not be rebuilt since the seismic hazard indexes exceeded the allowed threshold. Rebuilding Teora would have therefore required dividing it in distinct parts.

In this way, the old dialectic between the monuments and the connective residential fabric ends. While the latter becomes an emerging element, the role of the connective element is assigned to the continuous presence of the natural soil that defines the contours of urban figures.

The formal structure of the Teora territory reveals the ridge, consisting of plateaus interspersed by cliffs, the hillside and a "spur" that overlooks a long and narrow valley.

On the ridge, the project undertakes to rebuild the "Corso", the principal path of the town, which played an important role in defining the identity of the local community, the mother church, and the "Castle". Before the earthquake this building was already used as a residential building and its original position change in order to adapt to the arrangement of the new "Corso".

Down below, along the hillside, the project develops a residential area composed of six blocks. They are arranged in a comb system and placed orthogonally to the trend of the contour lines. Here again, as in Muratori' projects, the shape of the ground defines the dimension of the residential buildings.

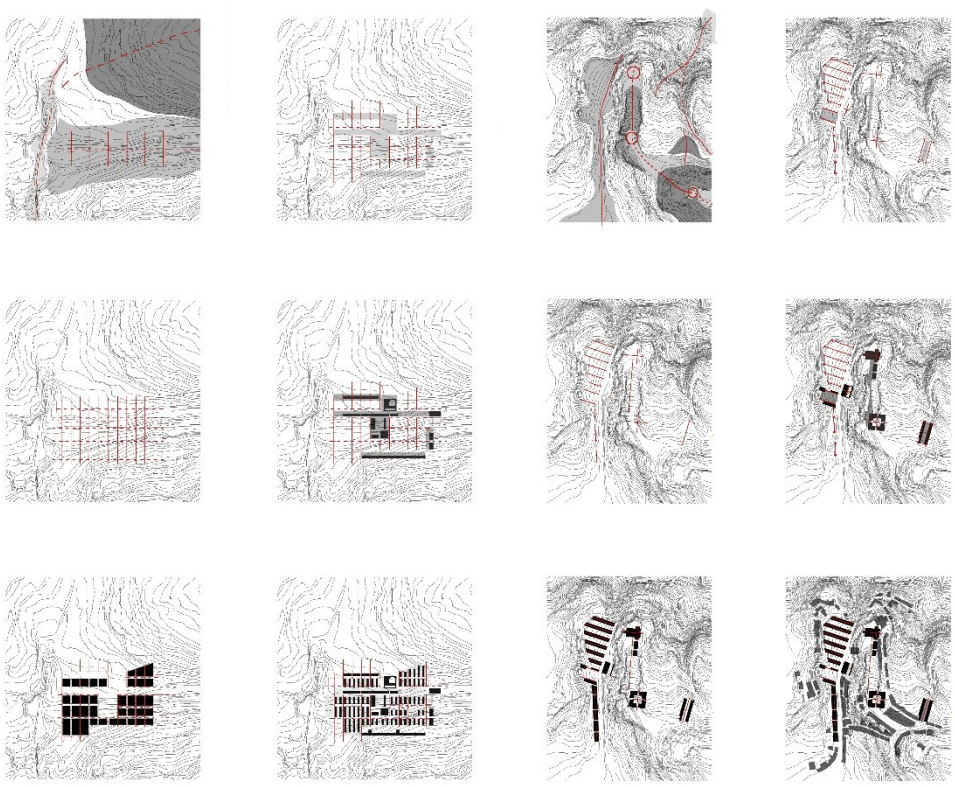

Figure 3
"Conformity rapports" between territorial and urban structures _ on the left, the project for the new town of Monteruscello, 1983; on the right, the project for the recuperation of the historical centre of Teora, 1981.

On the same hillside, Grassi and Renna recognize a prominence, and build a small square that opens up to the surrounding landscape.

A second residential unit is developed on the other side of the hillside, on the "spur". This unit is composed of two long residential buildings that define a common square oriented towards the valley.

These spaces are two further examples of public places in which it is possible to contemplate nature.

Project for the new settlement of Monteruscello, Pozzuoli, 1983

The construction of Monteruscello, which unlike Teora is a brand new town, was necessary because of the bradiseismic crisis that struck the city of Pozzuoli in 1983.

As well as having to deal with the great civic engagement related to the state of emergency and with the complex issues raised by the need to transfer a significant part of a seaside town in the inland countryside, Pozzuoli also had to address the questions concerning its transformation into a linear conurbation of small towns from the sea to the inland countryside.

The new town spreads on the narrow and steep slopes of the craters of Campi Flegrei, opening up to the interior plains of Caserta. The settlement is divided into three distinct morphological units. The role of keeping together these three parts is assigned to the system of public buildings.

The top of the slope is the central core of the village. Further down on the valley floor, the commercial area is developed because this place is easily connected to the infrastructure system. Finally, the University district and the industrial zone lie on the other side of the railway.

The central core represents the identity of the new settlement. For this reason, Renna defines the design of this area in greater detail, while he defines only the volumetric composition of the other parts. The project of this part, called the “old town”, often resorts to analogy. The urban structure closely resembles Priene, the inhabited wall that contains the high schools and defines the boundary of the borough, somewhat reminiscent of Schinkel's projects (Pagano, 2012).

Even in this case, analysing and interpreting the territory is essential to defining the new urban structure and the new characters of each urban element.

Because the new borough is located on a slope, the chosen solution was to build a grid of rectangular terraced *insulae*, whose shape makes it possible to catch a glimpse of the high part of the city even from its lowest point. For this reason, the depth of the terraces regularly decreases moving upwards.

Moreover, Renna explores new possibilities for the open or closed courtyard buildings, which derive from the Neapolitan tradition, through the variation of the relationship between the building and the ground. The relationship between urban morphology and building typology is further enriched by its relationship with the forms of the ground.

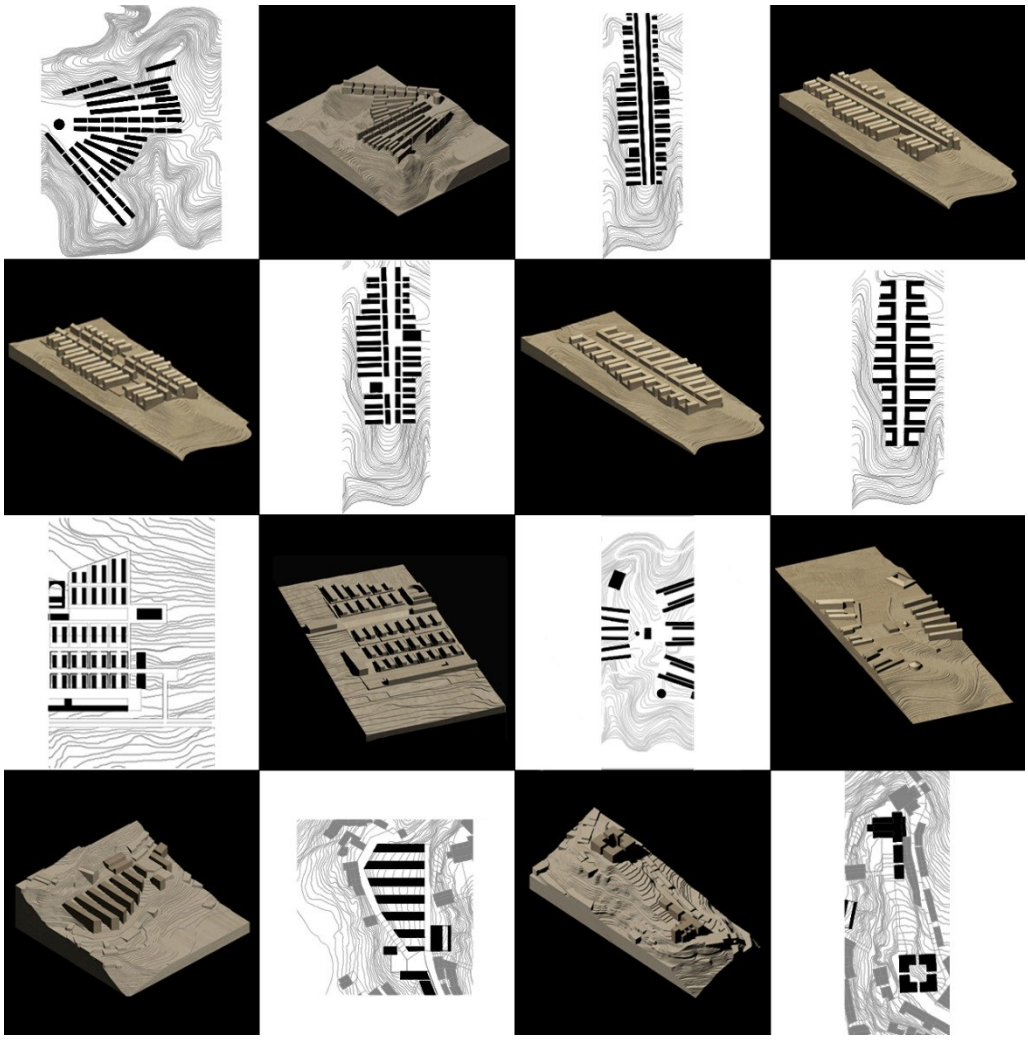

Figure 4
"Correspondence relationship" between geographical and urban elements _ Projects for Ina-Casa quarter, Magliana II, Rome, 1957; project for the new town of Monteruscello, 1983; project for the recuperation of the historical centre of Teora, 1981.

New paradigms of the city-nature

These theoretical and design research, together with other Italian experiences of that period, and also together with the later experiences of the '80s conducted by Vittorio Gregotti and Franco Purini (even if they dealt with this issue in a different way), have traced some guidelines that offer many suggestions for contemporary urban project and for the management of anthropic territories.

In the light of the above considerations about the structural and dimensional urban transformation, and considering the need to relate cities to the territories in order to give a new meaning to the urban structure, it is necessary to hope for a closer dialogue between the disciplines of urban project and physical geography.

In addition to these projects analysed as case studies, it is possible to identify a large number of experiences, developed in the same cultural environment, or at least in continuity with it, which recognize the need to restore the relationship with the physical geography.

Their beauty is based on several insights, which build the new paradigm of "city-nature":

The *city-territory*, composed of fragments, of distinct quarters, can build its own structure in relation to the forms of the physical geography.

The individual parts of the city can develop their autonomy through the dialectic between their finite nature and the continuity of the natural soil. In this way, the different quarters could participate in urban relationships and contribute to determine the pluralistic identity of the city.

The dimension of urban spaces can be defined in relation with the "measures" of the natural elements; and this means that it is possible to find a deep harmony between human scale and territorial scale.

New urban spaces can be enhanced through the dialogue with the natural elements, and the type-morphological characters that distinguish them can be defined in relation to the shape of the ground.

Starting from these insights, and adopting the idea of a strong relationship between architecture and geography, these projects developed different strategies in order to give new settlements a strong identity and a suggestive character. They uncover a clear formal vocation already contained in the geomorphology and, in this way, they conform new quarters that can enhance the original character of the place. They are extraordinary examples of "city-nature" (Moccia, 2015).

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