

HETEROTOPY: HETEROGENEOUS STRUCTURES THROUGH COMBINATION OF GEOMETRIC BI-DIMENSIONAL SYSTEMS

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Abstract: *Processes of instrumental development in the study of forms imply logical mathematical thought. These are convergent questions in the conceptual aspect of design. The mathematics – design relationship is framed within the contributions in this field. Projectional activity requires detailed studies in interdisciplinary fields, of which this is one. The aim is to experiment in the question of overlaying and combining simple planimetric systems and search for spatial solutions through a morphological interpretation of this relationship. Studies on the notion of order, in a generic outline, lead to a comparison between different cases, in the search for differences and similarities in systematic consistency. Differences acquire cohesion through continuities or articulations between one system and another. Applying these criteria to works of architecture, one can approach the analysis of forms, understood as processes and not as entities or preconceived geometric systems. Digital techniques make this experimentation possible, both with regard to the combination of planimetric systems as well as to the representation of spatial configurations.*

1 TRANSFORMATION AND VARIABLE GROWTH

One of the areas of difficulty linked to the field of design is that of formal structure. Formal structure, in spatial patterning, is the confluence of two opposites: the systematics of geometry and randomness. In concrete terms a form is defined as the arrangement of parts in relation to a whole. In generic terms we can say that whatever the arrangement, there is always an underlying order to be found, seen as implicit relational logic. This means considering that forms or sets of forms are not governed directly by the “legality” of geometry as such but rather by the “interpretations” in a formal composition. Formal structures are interpretations where, in addition, variable factors are involved in each design case. Current concepts on form in design reject the static and unitary entity as a whole in itself. Following along this line, systems take on a significant role and therefore forms are perceived as systems. If we were to maintain the idea of systems in terms of the iteration of the laws governing units, we would be returning to the abstract planning of forms without any consideration for the factors which contextualise or condition these forms.

Our study is based on the possibility of finding or discovering the *modus operandi* from a system for deriving alternatives of transformation and variable growth until another, more lax, degree of systematics is found, one which is capable of responding to specific situations without affecting the identity of the whole. This identity only depends on the significant constants and not on mere repetition. By this we mean that the idea is to combine the randomness of variables with structural consistency (a significant factor). We have stated that structure is an order that serves as a basis for the arrangement of parts. A structure that expands might be an infinite succession similar to the origin, or might do so through “organic systematics”, with a changing development.

The concept of structure used for the origin of the outline, initial data, is extended to the systematic constant. Therefore, random variables should be resolved as strategies identified in the system. The system generates ideas in continual transformation.

The principles underlying a generating outline should be such that they permit limitless growth. They must take into account the possibility of change whilst maintaining geometric structure. The variables foreseen are governed by continuity and unforeseen variables are circumstantial and random. This implies that such transformations take place in the organisation as alternatives within the organic whole of the system.

Formal principles in the field of architecture and urbanism are variables in terms of organisation and in regard to the philosophical conception of forms. Nevertheless, generation, as the basis of design, is viewed in terms of the relation between order and complexity. The question remains as to whether the notion of form comes down to how to manage this relation.

From this position we can strategically manage individual cases, through an understanding of the structure that endows them with sense. This holds true both for the

question of urban planning as well as for architectural forms designed for a specific place.

The following problem then arises. The relationship order – complexity is bi-univocal. Order is sought in complexity without ignoring random and individual factors and the variables of transformation are sought in an original abstract order. Complexity is not as such when an underlying order is understood. This order generally responds to different levels of organisation. In the case of urban planning the areas that define the divisions of territory are different in size and some may even constitute subsystems within the organisation of the set. These subsystems are, indistinctly, the result of the partial grouping of units or the division of a larger area. This is one way of including diversity in set structure.

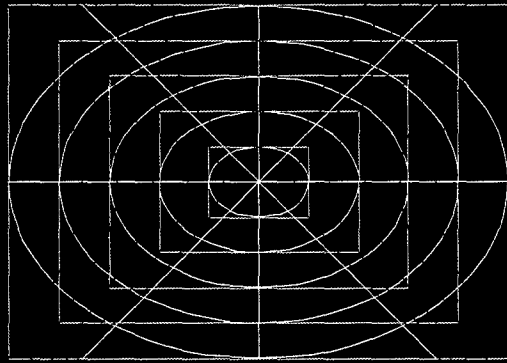
Another way is to establish alternatives of transformation generating particular structures for the individual case while contemplating the resolution of continuity in the structural consistency of the whole. This is the case of urban intervention strategies for areas with their own identity.

If we consider the problem in the process of mathematical configuration, the generating system might have different origins, but the structure of the system must accept the transformation, incorporating it without discontinuities. These processes imply logical-mathematical thought, from which our aim is to find articulations and derivations to design structures as alternatives in an initially established order.

We have stated that the starting point for a variable growth structure might be a figure as an entity of geometry or a system as a generating law. The initial order now proposes the beginning of constant growth through similarity or extension and repetition depending on whether it is a question of a figure or a system, respectively. We shall consider the case in which both possibilities are given simultaneously: figure and system, inter-related.

In growth through extension or through partial repetition of one possibility or another, there are variational alternatives with regard to the original structure. In turn, the figure contains the interpretation of a section from it or vice-versa; which in turn increases growth alternatives. Partial combinations of systems included in initial structures open up another field of operations for the development of variants. To complete the range of alternatives, transformation is still to be mentioned, both in the case of the figures as well as in the case of the systems, through qualitative changes in the scale or “controlled transgressions” in the development.

The proposal that we set out in this work is the overlaying of four chosen systems: a rectangular system derived from an orthogonal system, two hyperbolic systems and an elliptical system.



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