LOGICAL MODEL OF SETTLEMENT MICROSTRUCTURE

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Settlement research has not yet been concerned with the microstructure of human settlements, with the genesis of structure as basis of macrostructure phenomena.

Normative and quantitative requirements of insolation, ventilation, distance, population density, services, etc. do not refer to the microstructural environment. They may control it but are not able to "program" it. In consequence wide possibilities are open to the planning practice for individual development, depending on the designer's personality and aptitude; thus imposing a great responsibility upon him, as the microenvironment is in the closest interaction with the user.

The question arises also as whether the settlement microstructure has any categories of general validity, indispensable for describing, planning or imagining the human environment? If there exist such categories they also form a continuous system with a structure and in this structure and its change reality has to be reflected. Here it will be tried to reconstruct this supposed structure, with the conviction that it represents also the objective logic of microstructure planning.

1. Concept of the element and the structural unit

The smallest elements of the settlement structure, structurally still definable, are simultaneously the primary cells of the microstructure. To determine them, the following criteria have to be satisfied:

1. The smallest unit, still definable from the aspect of settlement structure, must have features involved in the concept of structure. Namely it has to form a group of activities or functions organized by the communication network. (Structure principle).

2. The smallest unit must not be divisible into smaller parts, as under item 1. (Principle of indivisibility).

3. Its area should be confinable, i.e. it should form a relativized structural system. (Area principle).

4. The parts of the unit should be connected more intensively than, and differently from, the unit to its environment. (System principle). Thus the primary system of the microstructure is understood as a *complex activity group with its inherent physico-spatial framework with parts in direct functional and physical interrelation but as entity, unable to communicate with other primary systems* else than through communication networks.

If several primary systems are interconnected to form not only a quantity but a quality excess, a *structural unit arises.* This quality excess is manifest by the changed position of units relative to their environment, it will be richer, more differentiated and determined in a different way as before the integration into a structural unit. This has an effect both on the internal structure of. and on the interrelation between, the elements. This kind of association of elements can be considered *as organization on the system principle.* Namely the concept of structural unit supposes an *organizing principle*, discontinuing–preserving the elements by integrating them into a higher, complexer structure. Thus, categories of the element and the structural unit are in a dialectical relationship.

This dialectical relationship is essentially the logical basis of the microstructure. The regularities organizing the elements into complexer structural units can be formulated in the methodology of model construction as *operations.* Thus the structural unit can be described not only as *a complete formation but also as a process.* In this sense the structural unit can be derived from a set of primary systems, to which operations are assigned. The structural unit results from these operations, and as several operations can be defined, several element combinations can be created with their application. *From the viewpoint of the process* a definite element combination as structural unit may be considered an element, subject to the same operations. Thus the dialectics of the element and the structural unit is at the same time the methodological model of the model construction.

2. The applied operations

With the above definition of the categories of the primary system and the structural unit, let us find real structural development processes convertible to relatively simple design *operations.* These operations will be applied first on the elements, then on the newly arisen structural formula as long as the process yields new structural formations. Applying these operations on the structural formulae permits an accelerated reproduction, on a logical level, of the real processes in a lengthy, contradictory historical development.

Simulation of this structural development not only reduces in imagination the time of actual effects and processes but permits to reconstruct effect chains difficult to occur, or inexistent in reality.

2.1 *Recurrence*

The most conspicious feature of settlement structure is the repetition of certain elements, lending a certain homogeneity to the structure. Sites, flats, buildings, institutions etc. might repeat themselves, even the relation of a dwelling to its site or of a building to its garden and to the street may create repetitive patterns.

Repetition is present in the algorithm as the *operation of recurrence*, meant as an operation *leading to the continuous recurrence in space of structural units of discretional complexity.*

2.2 *Transference*

The peculiarity of the historical development of the dwelling function where certain functions separate from the dwelling and become instituted as independent establishment will be called transference, such as bringing up and education of children, eating out or washing became in time partly or entirely social functions.

This process may also be translated directly into a design operation: thus transference means an operation to place some element of a *given structural formula* outside the structural formula, facing it as an independent element. By definition, the transferred element must remain in an unambiguous contact with the emitting structural formula. This latter may, however. be considered as a separate operation, namely the phenomenon of relation is an independent structuralizing factor. If the transferred element belongs simultaneously to several independent structural units, the point is a qualitatively higher process. The resulting new element is named the section of the structural units participating in this operation. The section as "common element" tends to the most convenient place in the spatial structure obeying a special force of gravity. The energy centre of this gravity space is formed by areas which are in the most favourable relationship with structural units inducing the section.

2.3 *Connection*

The diversification and growing importance of connections between structural units with the differentiation of regional division of labour can be historically demonstrated. The more the structural formulae connected to each other and to the environment by a single intermediate zone, the greater the probability for it to become the line of force, axis of structural development. It is not accidental that in course of historic development, urban thoroughfares attracted public functions in particular in the area around traffic junctions.

The operation corresponding to the above process will be termed connection, meant as an operation making two or more structural formulae potentially a single complex of higher order.

2.4 *Ordering*

A direct connection between function groups of identical character permits a division of functions. Thus, it would be useless to repeat mechanically certain establishments in common gardens of multistorey blocks of flats, since if they are coherent, each garden may have its part function, permitting a differentiated satisfaction of claims to a green belt integrated into the complex of connected structural units.

This phenomenon can be made counterpart of an operation termed ordering, a process resulting in a division of functions between elements of identical character. The division of functions presupposes and also affects the connection between elements. Thus, ordering may be elicited by the connecting operation or vice versa: ordering may strengthen the connections and affect thereby the arrangement of the elements.

2.5 *Interference*

In the space of connected structural units an also historically demonstrable, special structural penetration may be observed, making the space a kind of gravity energy centre for the connected units. At the junction of two main roads — hence, of the connected structural units organized by them — history shows public institutions, shops, squares to develop; this is how agora and forum, market places and star-shaped district centres came to being. This centre-forming potential of junctions can be observed on every level of structural development; the phenomenon is the expression of an elementary, dynamic regularity valid on the microstructure level, too.

Interference is the operation making an interior (not transferred) element of a structural unit simultaneously an interior element of another structural unit. Interference is not the possibility of transference, but creation of a structurally exposed area. Thus, this area should be considered first of all as a potential field, actualized only upon the effect of interior and exterior forces hence if interference is joined by other operations.

2.6 *Superposition*

Former operations imply that the imaged structure development processes take place in a definite plane. In reality, however, structure development is spatial.

From the aspect of modelling, structural spatiality is understood as to consist of identical or different structural planes structurally connected or not. This concept corresponds also to the nature of the structure, and has an operation termed superposition as counterpart. Thus superposition means several structural planes on top of, or under, each other. All operations described may be applied between superposed structural planes.

2.7 *Transformation*

Change or exchange of buildings, building complexes or territorial–structural units are a natural occurrence in the structural development of settlements, an operation to be termed transformation in modelling. Thus transformation is an operation changing the purport, character or the interior structure of a structural unit or both simultaneously. In addition, any procedure substituting the complexity of a given structural system into a structural system of another type will be termed transformation. This operation may be considered as analogous to the information transmission. Analogy results from that in exchanging a given structural formula, nearly always the complexity of the original arrangement is increased, with the increase of complexity, however, information increases, involving an — in principle measurable — change of the arrangement, structure and connection system of the elements.

3. Microstructure model levels

Different structural units may be created by applying these operations on the assembly of primary systems. As the operations can also be carried out on the new structural formulae, it is expected to obtain manifold systems of different compositions and complexities. In this diversity, however, characteristic ranges of complexity can be distinguished. Within a given complexity range, the complexity and the combination possibilities of structural formulae may be very diverse, without leaving the unambiguously definable pattern of a typical structural basic formula. These complexity ranges are the levels of the model.

3.1 *The primary system* (ER)

The prototype of the ER model is a structural unit consisting of a flat and accessories (courtyard, garden, garage, workshop, storage etc.). But ER may represent not only a flat but also a group of flats structurally satisfying the definition above. Such a group of flats has to consist of functionally con nected parts; as separate flats in themselves do not fulfill this condition, only common accessories can act as organizers to a system. From the aspect of modelling, it is considered that a given accessory element acts as the interference of a definite number of flats. The flats and the interference element have to be directly connected, the only case where the resulting structural unit may be considered as a single ER. A multiflat ER is an element combination, its multiplicity depending on the type of operations and the number of accessory elements. The possible choice of ERs and of combinations produced therefrom through interior operations yields the first level of the model.

Like any system, also the group of flats can be divided into part systems, elements. From these the flats, repetitive elements representing the basic function, are considered as homogeneous, the common accessories as inhomogeneous elements. This methodological exposition will disregard the concrete, historically and socially changing purport of the inhomogeneous elements, stating simply that always different accessories belong to flats.

The number of distinguishable inhomogeneous elements in an ER refer to the interior complexity of the structural unit, manifest for the environment only in that it appears also in external nodes with different communicative functions. Functional variety of external nodes is considered a number typical of ER, the system variable. The number of variables expresses also the minimum of variety of the internal built-up of the system; further subdivision of the built-up has no effect on the microstructure.

3.2 *Linear environmental unit* (LKE)

External nodes are in fact the "physical limit" of the complexity of ER as a structural unit. Although the formula supposes the presence of communication nets on the "other side" of external nodes, and even asserts it by the variety of the group of elements, but the net itself as an exterior intermediate zone is excluded from the range of components of the structural unit. Thus only an operation suiting to integrate the groups of elements and the communication nets to a structural unit of a higher degree can defer from the first level of the model. This can be achieved by applying the operation "interference" in a definite way.

Interference of coincident external intermediate zones of n ER-s results in a network-type element, creating as a common but external element, a higher order organization of the ER-s. The operation results in a qualitatively novel formula, representing the natural, ancestral pattern of the spatial organization of element groups.

As there is neither a specialized nor an everyday term to designate a structural unit consisting of elements organized to form a street (namely the semantic meaning of the word "street" is much more restricted) the composite expression "linear environmental unit" (LKE) will be used further on.

3.3 *The central area* (KH)

Internal operations on the LKE-s result in the combination space of the second level of the model. Here only the operation leading out of the complexity domain defined by the LKE, able to produce a further model level is taken into account. Such an external operation is again a particular form of interference. Namely, if two independent LKE-s are interpenetrating so that there exists a common area, part of both, then it represents a qualitatively new microstructure formula named central area. The central area (KH) — is — like the street — primarily a structurally active field, with a special structural development potential. If the street within the LKE could be described as a linear field, then KH may be considered as a central field. If the linear field acted by spatially organizing the groups of elements, then the central field is a higher form of spatial organization of the LKE-s. KH is just as ancestral, determinant category of structural development as is LKE. Historically developed kinds of KH are e.g. the forum set out at the intersection of cardo and decumanus, the system of main squares and institutions at the junction of streets leading to medieval town gates; city centres developed at the junction of thoroughfares or as a simple example the characteristic siting for shops and institutions always preferring busy spots, traffic junctions to structurally more indifferent places.

In the simplest case KH as interference of the LKE-s materializes some common, transferred function i.e. section of the ER-s, organized by LKE. Overlapping of the LKE-s is an external operation leading to the third level of the model, determining a new complexity range.

A basic peculiarity — and at the same time inherent contradiction — of the KH formula is to be common part of two (or more) LKE-s. Namely KH consists structurally of ER-s and net elements, organized centrally rather than linearly. The KH is not merely a complex of inhomogeneous ER-s but also a higher organization of two or more LKE-s. Therefore the structural system consisting of the KH and the interpenetrating LKE-s producing the former is the central environmental unit (CKE), as term for the process and for its result, issuing from the interference of the LKE-s.

Dynamics of CKE points to an important feature of the three-level model. As the KH — only structurally — is formed of primary systems, the construction of model levels proves to be a feedback process. Namely the primary systems of KH —through in a higher structural situation with changed purport — essentially return to the first model level and their development tendency reproduces the second level of the model. Thus, in the process of constructing the model levels the elements perform a peculiar dialectic movement, where the elements and groups of elements represent the starting point, the "thesis", which becomes its own opposite, in the LKE formula this "antithesis" is synthesized in KH, where the elements "discontinued-preserved" appear in a complexer structural context.

4. Dialectics of microstructural units

Having deduced the three superposed microstructure levels of increasing complexity, let us elaborate the typology of systems arising from the interference of structural units, by asserting the dialectics of categories "element" and "structural unit" permitting to consider — from operational aspect — any structural unit as an element which, subjected to the operation, yields further, complexer structural systems. Not only combination possibilities within particular model levels result but also interaction of structural systems at different model levels can be described.

4.1 *Element combinations within the* LKE

The street as organizing principle not only integrates the elements and the groups of elements into a qualitatively higher unit but also connects them. Though connection is an operation likely of initiating several structure-forming processes, that can be described by further operations still performed on the ER-s, but within the limits of LKE, that is, supposing an external connection between the ER-s.

If the LKE consists of single variable, homogeneous ER-s having accessories with external nodes, then these latter can be ordered, manifest by division of functions between affine accessories (Fig. 1).

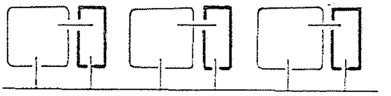

Fig. 1

Although ordering has led to division of labour between the common accessories within the LKE but these elements structurally always belonged to the one and the same EK. The operation of transfer may, however, render the accessories independent structural units, inhomogeneous ER-s. Concentrated disposition of similar accessories as sectional elements is essentially the operation of transfer applied on the ER-s. The transferred elements remain within the LKE organization, thus the operation only increases the variety of the formula, but inside its complexity range. The sectional element resulting from the operation — contrary to ordering — is an independent structural unit belonging to no ER organization but contacting every one through the common street as public zone (Fig. 2).

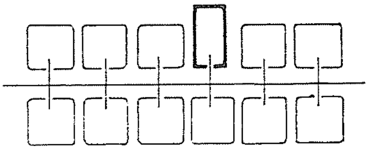

Fig. 2

Transfer may of course affect not only a single but several accessory elements. A structural unit has to be considered the complexer, the more of different transferred sectional elements it contains. The case where the transferred element(s) concentrate on one side of the LKE may be considered as a structurally independent combination (Fig. 3). In this case, one side of LKE is the group zone of ER on the other side.

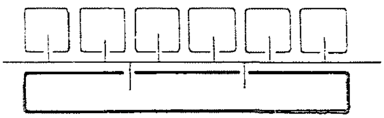

Fig. 3

Operations of ordering and transfer could increase the LKE variety to a limit, owing to the connection organizing the initially independent ECS-s into LKE-s. In this higher organization the function of the street as a connecting element before the operations was restricted to connect the external nodes of the ECS-s. The operations enriched the purport of the street by the common accessories. Thereby, however, the LKE became similar in many respects to a complex combination of elements, differing obviously by presence of the street alone, functioning as an external intermediate zone. By "closing" the intermediate zone at the boundary of the structural unit, i.e., by transforming the intermediate zone into an internal one, the LKE would become an EK.

4.2 *Fabrics*

Organization of elements and ECS-s into an LKE and its combinations has been investigated within a single structural unit. Actually, operations applied to now did not suit to repeat the basic formula. Special operations will be necessary, permitting structural integration of several LKE-s. There may be, however, a circumstance permitting to repeat the LKE-s without introducing special operations. This circumstance is produced by the symmetrical ECS-s with at least two variables themselves, namely, ECS-s organized simultaneously by two different network elements are expanded nearly automatically since network h_1 supposes existence of h_2, this latter, however, produces another h_1, bringing about an h_2 again, and so on. The system of LKE-s to be thus expanded from the ECS-s with at least two variables is the fabric. As complexity of the fabric is determined by the number of ECS variables, there are fabrics of 2, 3, . . . n variables.

The multivariable fabric — dependent on the relative position of the two LKE-s may have alternatives: one is where the LKE-s do not intersect; to be connected requires a separate operation. This system is the one-dimensional fabric, because its expansion permits only parallel, one-way repetition of LKE-s (Fig. 4). In the other alternative the LKE-s systematically cross

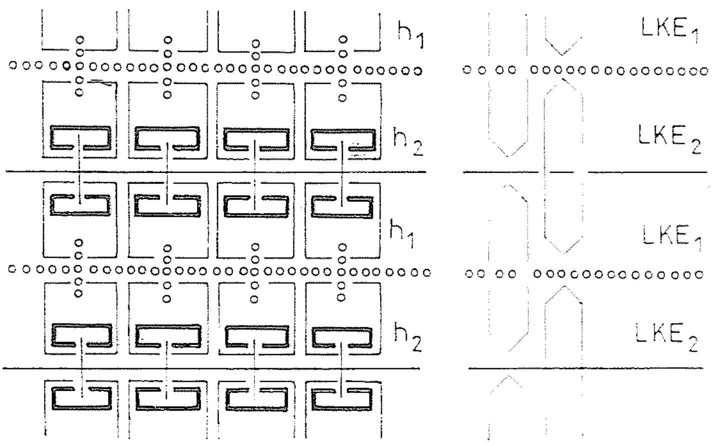

Fig. 4

each other. This type of multivariable fabrics may be named two-dimensional expansion, repeating the LKE-s simultaneously in two directions (Fig. 5).

In a given structural plane, however, the variety of fabric-type systems does not depend on the variety of the external nodes of the ER-s alone. As operations are carried out not only on ER-s but also between LKE-s, any earlier type of LKE-s may be substituted into the basic formula of the fabric such as that seen in Fig. 3, resulting in a self-contained LKE with only transferred accessories. In compliance with the above principles the ordering operation may be applied, permitting labour division between the accessory functions. Performing operations along the second variable similar to those

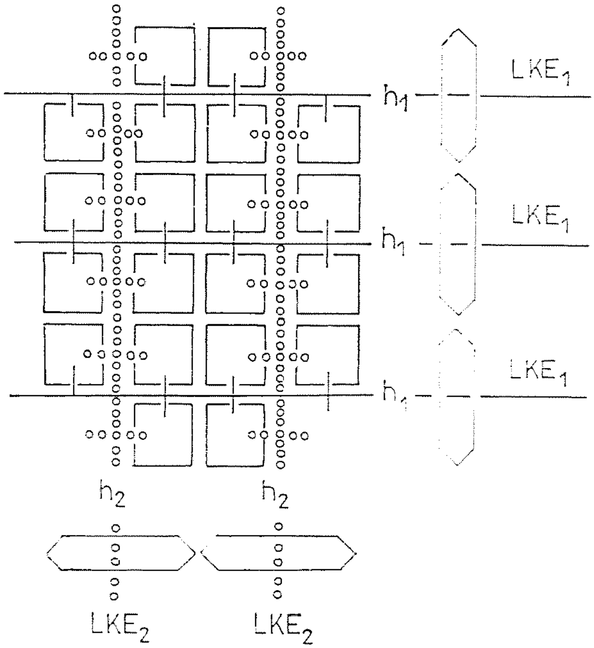

Fig. 5

on the first one but with accessories conform to the type of the second network, the fabric will feature repetitive pattern of two different, inhomogeneous LKE (Fig. 6), that is, a bilinear fabric is obtained.

The above series of operations can be carried out also on fabrics of 3 and 4 variables. As fabrics with more than two variables are *a priori* bidimensional — on a given structural plane —, expansion of the linear, open group

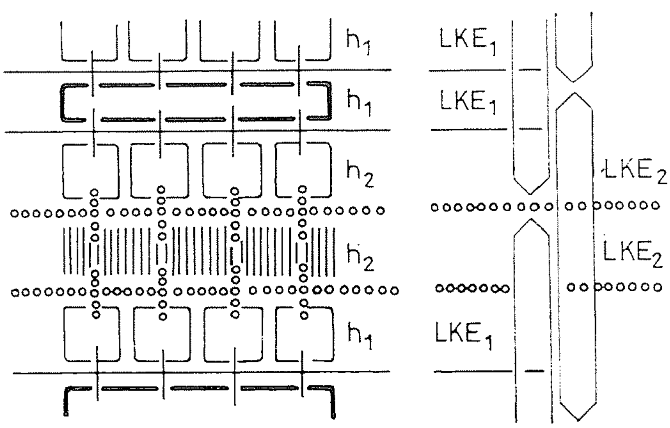

Fig. 6

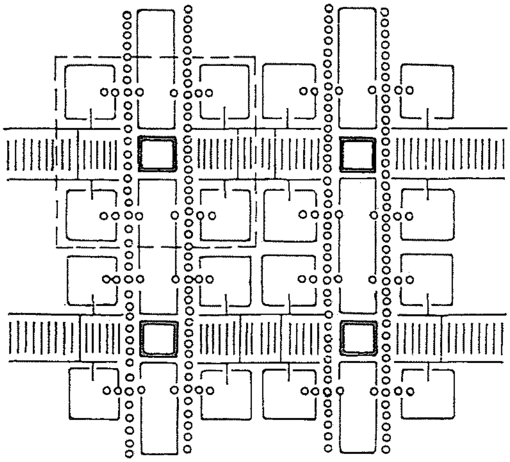

Fig. 7

zones leads automatically to overlapping. Though, overlapping of two different linear, open group zones defines a central place.

The character of the KH may be defined by some common element of two linear and open group zones but also another transferred accessory of the four ER-s of the CKE may get in the structurally exposed area. The fabric itself is composed of essentially equal, repeated CKE-s. The analogous KH-s being interrelated, they can be ordered, resulting in a fabric — as simple as it is with a basic structure of a polycentric microstructural system (Fig. 7).

Substituting the LKE as shown in Fig. 2 permits to grasp the two-variable alternative of LKE by assigning the second network to the transferred accessories. Accordingly the LKE-s can be fabric-like expanded, meanwhile the transferred elements are organized into a crosswise, self-contained LKE. In conformity with the cross-wise organization of the LKE-s, this type of fabric is termed a cross-fabric, at a difference from the bi-dimensional variety of linear fabrics (Fig. 8).

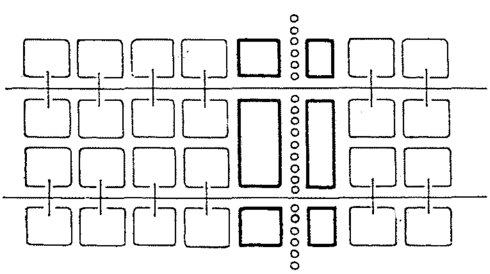

Fig. 8

The cross-fabrics may appear not only in themselves but also combined with linear fabrics. Because of the intercrossing of linear, open group zones of the two fabric types, the interference areas determine central places — similar to at least two-variable, bi-dimensional linear fabrics. Variety of these central areas is function of both fabrics; a one-dimensional linear fabric has max. 2, cross-fabrics have an arbitrary number n of variables.

The common feature of polycentric structural systems arising from the fabrics is the non-hierarchic distribution of the KH-s, namely character and association of ER-s completing inhomogeneous KH-s are determined chiefly by environmental factors. A given KH may only contain elements demanding identical or similar microstructural situation. This environmental determination of element association is provided by the character of interpenetrating linear open group zones. Thus, the polycentric systems can be named — in view of settling inhomogeneous elements — environment-oriented structural systems.

4.3 *Blocks*

The combination types produced from the LKE-s were derived from the variety of the basic formula. Now let us consider the result of connecting independent LKE-s of identical character. The connecting operation may affect either directly the ECS-s of the LKE-s or indirectly, the network elements of the LKE-s. The two different connections result in two different structural systems, to be termed block and net, respectively.

Relative position of two LKE-s where certain accessories of ER-s become adjacent permits to connect the adjacent ECS-s. The connection is realized by the internal intermediate zone between accessories. The connection helps ordering the elements, integrating thereby the adjacent EK-s into a common structural unit. Performing this operation on all the ECS-s of two LKE-s

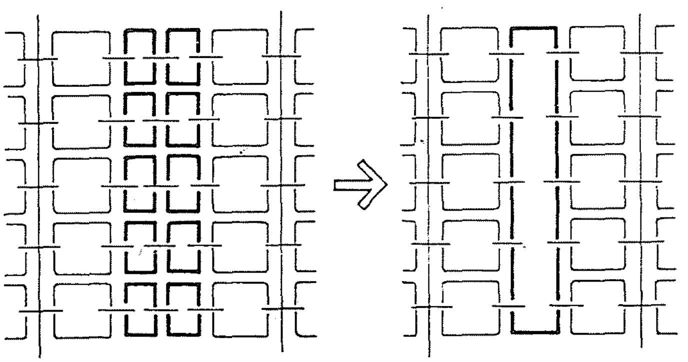

Fig. 9

rather than on a single couple of EK-s a complex structural system arises, consisting fundamentally of a single EK in the organization of two LKE-s simultaneously. Such a structural unit is the block, producible not only by connecting identical accessories but also by interference. Thus, two LKE-s interpenetrating in the inhomogeneous elements, i.e. having a common closed group zone belonging to both, is a block (Fig. 9).

The other basic block system combination is determined by the interference of two LKE-s cutting each other in at least one point. Also in this case, max. two variables can be assigned to the group zone and the formula can be expanded as above (Fig. 10). Alternatives produced by associating

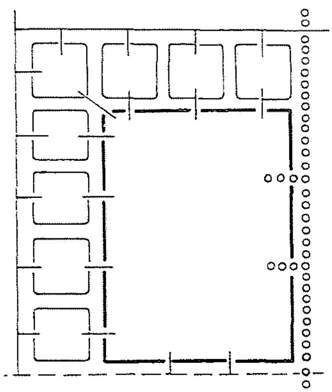

Fig. 10

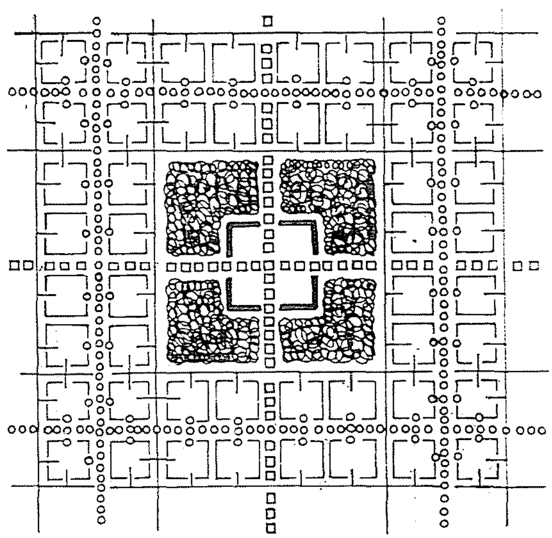

Fig. 11

the two basic combinations are characterized by a gradual closure of the block interior. Interference of 3 LKE-s results in a two-variable, that of 4 LKE-s only in a one-variable structural system.

The concept of block is, however, unaffected by the interference between LKE-s of the type shown in Fig. 3. Substituting this type of LKE into the block formula results in a structural system that is just the negative of the two-variable and two-dimensional fabric formula. This reverse, inverted proportion is manifest also in the appearance of central areas. Whereas in the case of fabrics the central areas arose from interference of linear group zones, in the block the spot of the four central group zones where the two different networks intersect becomes the central area (Fig. 11).

The block system in Fig. 11 may, however, produce another type of KH: crossing area of homogeneous LKE-s. Whereas for fabrics the KH-s arose from the interference of linear, open group zones, in case of blocks also LKE-s containing homogeneous elements may interpenetrate; obviously following from the nature of block organization. By this a KH with a different purport is obtained. In the area of KH — with symmetrical LKE-s — four analogous ER-s appear (Fig. 12).

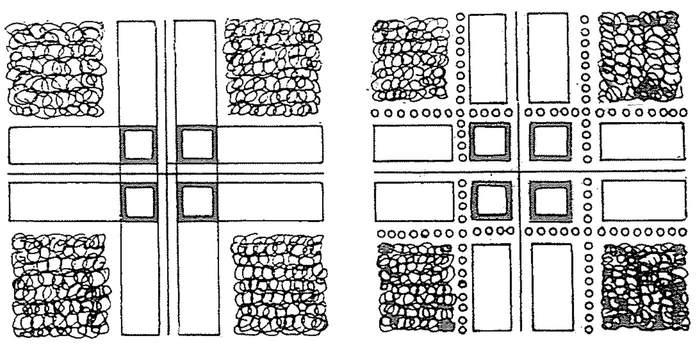

Fig. 12

4.4 *Nets*

If the LKE-s are joined by connecting network elements rather than external nodes of the ECS-s, structural combinations differing from both fabric and block, so-called nets arise.

The most simple form of net combination between two LKE-s is direct connection. This node-type connection permits repetition of structural units. Possible structural system combinations open new opportunities for expanding the inherent complexity of the LKE formula.

The group of nets can be traced back to three basic patterns. One is where the connecting node coincides with the final points of both LKE-s. This type is named chain. To a single node not only two but several LKE-s can be connected chain-wise. The other class of nets is that where the end point of one of the two connected LKE-s is inside the other network element. This class is named tree-type net. Finally, the third class results from connecting two parallel LKE-s. This connection is not of node character but itself an LKE, to be named grid. These three classes of nets will be treated separately.

4.41 *Chain-type nets*

Chain-like nets are fundamentally featured by co-ordination between LKE-s. As the chain is linking identical LKE-s in open external nodes, the nodal area has a special structural potential activizable by considering it to be interference of the connected LKE-s. The result is about to centrally "organize" the adjoining LKE-s. Thereby the chain-type KH creates a balanced CKE supposing structural energies of identical intensity in all directions (Fig. 13).

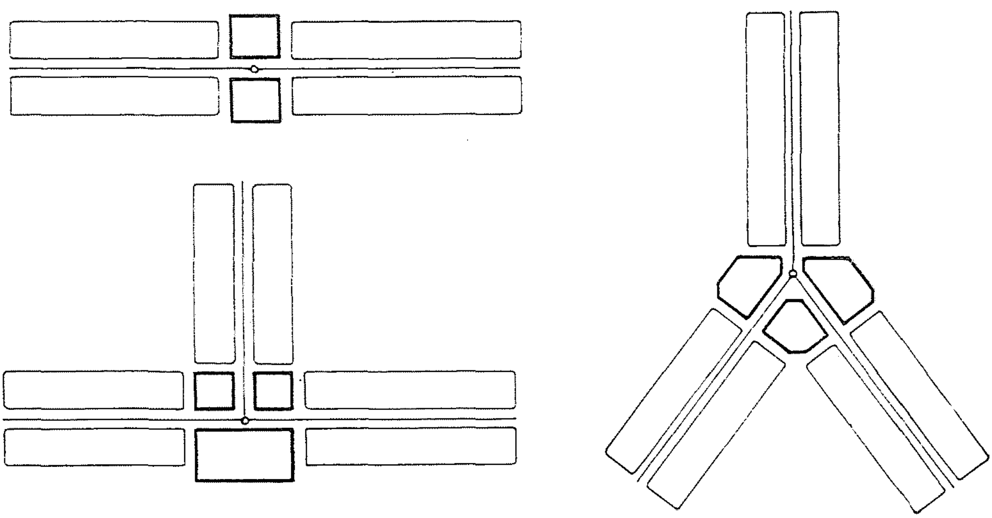

Fig. 13

4.42 *Tree-type nets*

The second group of nets is that where two LKE-s are connected so that the open external node of the one is inside the other's network element. This type is called a tree. Namely, adding further operations of connecting LKE

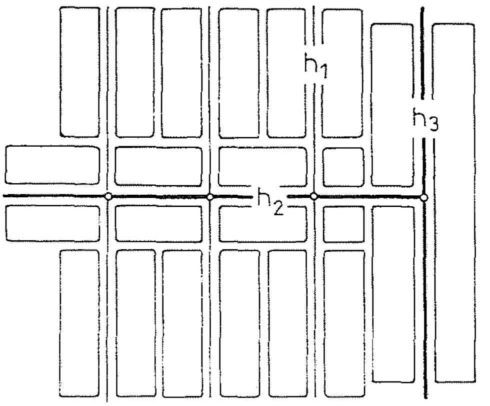

Fig. 14

to this, the structure formula results in a configuration like branches of a tree (Fig. 14).

Tree-type hierarchic systems are featured by subordination or superposition between LKE-s. Structurally it is understood that one of the two — hierarchically — subordinated or superposed LKE-s organizes the other, to be expressed by naming the LKE of lowest order to be of "first order", in relation to the one of "second order" organizing it. In this sense, in general, LKE-s of n-th order can be spoken of. The order does not refer to the forced or random character of movements in the network alone, but thereby also to the structural situation typical of the entire LKE. This situation may be

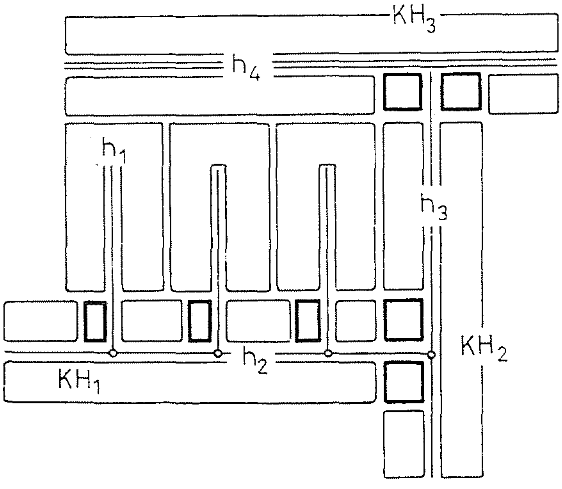

Fig. 15

manifest in the character of the ER-s but also in the tendencies of structured development deviating for different order LKE-s to be illustrated on the characteristic KH-forming capacity of tree structures.

It follows from the character of the structural formula that also the KH-s of the hierarchic net form a hierarchic system themselves (Fig. 15). With increasing order LKE increases the importance of the central areas. Interference of second- and third-order LKE-s primarily results in transferred elements of second-order LKE-s; intersection of LKE-s of third and fourth order will be the scene of some common activity of LKE-s of the third order and through it, of LKE-s of the second order. Thus, with increasing order, the structural background of the KH-s hence also the CKE organized by them increase in direct proportion. Therefore interference of an n-th and an $n+1$-th order LKE can be rightly named n-th KH, it being due not only to the n-th order LKE but indirectly also to the $n-1$-th, $n-2$-th, . . . etc. and first-order LKE-s. It is a typical distribution of the accessory and other transferred community activities. The lesser the frequency of a transferred element, the higher the order of KH tending to. This is a peculiarity of the KH purport: the gathering elements are not those with some functional connection, but those of a frequency leading to identical areal distribution. Opposite to multi-variable fabric KH, interference of two different LKE, purport of these KH depends on identical but hierarchically ordered LKE. In case of a fabric, the KH-s created a polycentric structural system, each centre having typically different contents, but within a given KH, association of affine or somehow related activities was typical. On the contrary, for tree-type nets, the variety of KH-s is determined by the hierarchic connection levels of the networks, where variety resides in the association of equally frequent, rather than identical activities. KH-s of a polycentric fabric are co-ordinated; those of a hierarchic net superposed or subordinated. KH-s resulting from internal combinations of fabric and tree are of different character, owing also here to the difference in structural development and the sequence of operations.

4.43 *Grid-like nets*

In the chain and tree nets the LKE-s are directly connected in node type. Two LKE-s may, however, be realized as connected indirectly by inserting an independent network element. Nets brought about by such a connection are named grids. The indirect connection can be realized not only by a simple — related to LKE-s, external — intermediate zone, i.e. a network element; also an independent LKE can act as such. In this case its both open nodes are within the network element of the two connected LKE-s (Fig. 16).

In dependence on the type of LKE-s connected by the external intermediate zone — either a network element or an LKE — three basic types

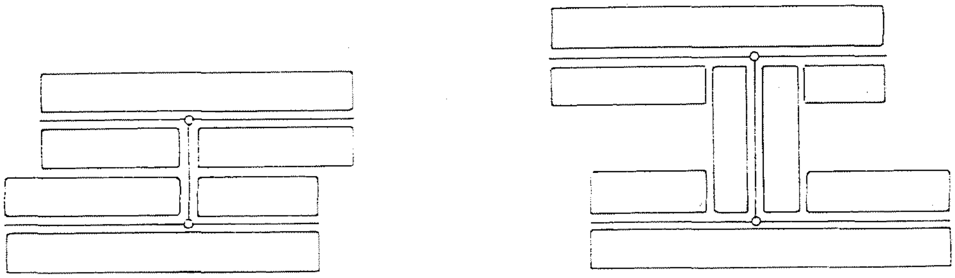

Fig. 16

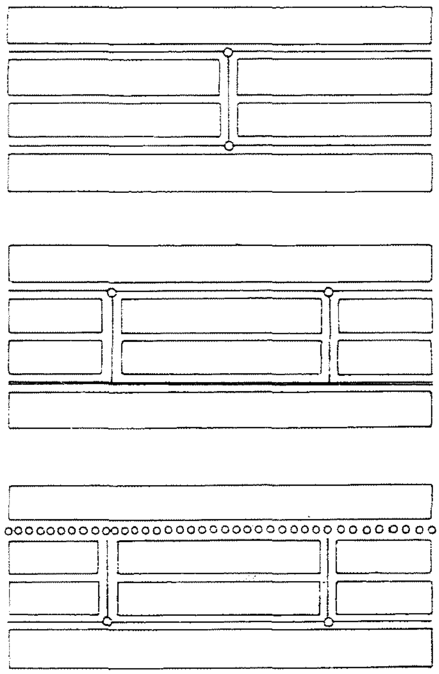

Fig. 17

of grids are distinguished (Fig. 17). One type is the connection of LKE-s of identical character and order. In case of the other type, the two connected LKE-s are of identical character but of different order. This type is a peculiar form of the hierarchic connection, the connecting element does not contribute to the net as defined for the tree structures but is an independent intermediator, able to connect even LKE-s of not adjacent order in the hierarchy and to enforce thereby the gradualness principle, about acting as the missing link. The third type is the connection between LKE-s of different kinds. This grid type may be considered as the structural phenomenon where any function of a multi-purpose network is separated. Between the LKE-s connected in this manner there exists always some functional relation.

5. Application principles of the model

The model is not valid to the whole procedure of housing design but only to the microstructure design within it. It is no design principle for a static pattern, an arrangement to be considered as an optimum for some reason, i.e. a ready-made spatial structure, but a method starting from actual conditions and concrete situations, offering the operational regulation system, the algorithms of structure construction. Interpreting the structure in general as an information system built into the arrangement of components of the settlement, the model is identical with the structure of this information system as a special language. Consideration of the microstructure model as an artificial language corresponds to the design function of the model. Also the model as a special language contains semantic and syntactic functions of elements corresponding to words, and those grammatical laws, by which the elements can be joined to become phrases. Even the model not only describes the primary grammar of structure creation but offers also the typology of simpler structural ideas to be assembled of the phrases. The essence of analogy with the verbal language systems is that the model helps articulated expression and assembly of structural ideas, i.e. to use a special structural language the interior logic of which may be acquainted, understood and acquired.

Summary

The idea of microstructure is analysed from the design theory viewpoint. Definition of the smallest, structurally still interpretable unit is followed by that of simple design operations to be carried out on structural units, such as recurrence, connection, transfer, ordering, interference, superposition and transformation. These operations yield an almost infinity of combinations of microstructural systems. These combinations form three superposed classes: that of primary systems, that of elements organized by the street and that of so-called central areas developed in street junctions. These operations are involved in developing the typology of microstructural systems.

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