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TOPOLOGICAL MODEL OF SET

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ABSTRACT: THE PURPOSE OF THE ARTICLE IS TO PRESENT A TOPOLOGICAL MODEL OF THE SET OF A SYSTEM.
THE TOPOLOGICAL MODEL IS DEVELOPED ON THE BASIS OF THE SPACE PERCEPTIONS OF THE STATE OF A SYSTEM.
THE TOPOLOGICAL MODEL CAN BE USED AS A METHODOLOGICAL TOOL IN DIFFERENT AREAS OF KNOWLEDGE. FOR EXAMPLE, IN ORDER TO REDUCE THE DEGREE OF UNCERTAINTY OF THE INFORMATION IN BORDER AREAS OF KNOWLEDGE.
THE CONCEPT OF THIS MODEL IS A PREREQUISITE FOR ITS COMPUTER APPLICATION.
THE DIAGRAMS IN THE ARTICLE ILLUSTRATE THIS CONCEPT BY LINEARIZATED IMAGES.

KEYWORDS: PSYCHOLOGY, SET, STRUCTURE, TOPOLOGY, THEORETICAL MODEL.

Set of a system

The fixed set of a system includes its relatively fixed phylogenetic characteristics.

The neutral set on a system translates the meaning of the information that flows between the fixed and the variable set. It is a transient mediator set.

The variable set of a system includes its rapidly changing ontogenetic characteristics.

Each level of organization uses a specific semantic language. Each level of organization of a object may realaize exchange of information (with minimal distortion of information) with the corresponding level of organization on it belonging to an object. For example: between electrons, between atoms, between molecules etc.

In general the interaction between the levels of organization of two systems flows in the contact between them i. e. mainly by their variable set. For example: the atoms interact predominantly through its free electrons; molecules - by their atoms; people – through concepts and categories etc.

Topological structures

We denote the topological space in which a system operates with the term "functional space" (FS). FS of a designated macrosystem, which doesn't depend on the behavior of the external medium, can be regarded as a sphere. The central space of the spherical FS characterizes the individual nature of a macrosystem. The surface of FS characterizes macrosystem's contact with the external medium.

Accordingly the fixed set of the macrosystem is situated in the middle of this FS. The variable sets of the macrosystem is situated on the surface of this FS. The variable set of a macrosystem is realized by the variable sets of the systems of this macrosystem. FS of the fixed set of a macrosystem is the most stabile, because it communicates by means of

- minimal surface with its external medium (the spherical space has a minimal surface per unit volume),

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- the sets of its systems.

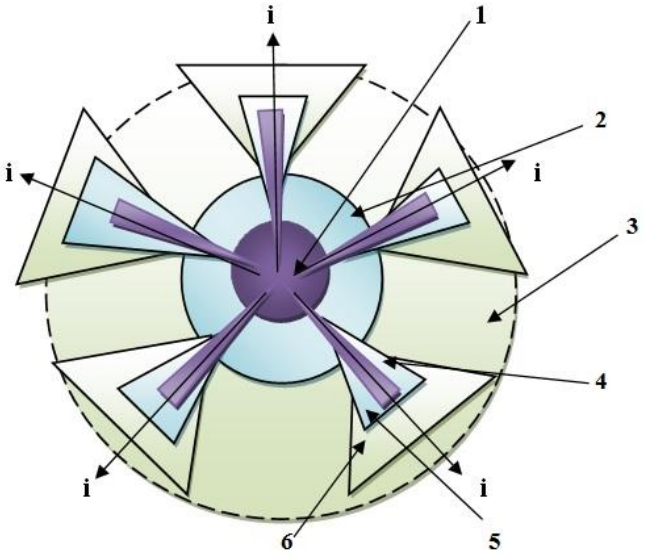

Fig. 1. Scheme of a cross-section of functional space (FS) of set of a macrosystem, built by the functional spaces of the sets of five systems in direction of a level of organization i

1 – FS of the fixed set of the macrosystem
2 - FS of the neutral set of the macrosystem
3 - FS of the variable set of the macrosystem
4 – FS of the fixed set of the system
5 - FS of the neutral set of the system
6 - FS of the variable set of the system

The systems communicate with each other and with the external medium. Its tip focuses to the center of the FS of the macrosystem. The periphery of the variable set of FS of a system is a part of the surface of FS of the macrosystem. FS of every system is a cone.

The evolution continuity of the systems is a copy of a part of the functions of their macrosystem.

The system has a high degree of freedom to respond to external influences. These influences are external to the macrosystem or they are a result of interaction between the systems of the same macrosystem.

Each system has a fixed, neutral and variable set (fig.1).

Each system interacts with the surrounding medium through its variable set. Accordingly, FS of the variable set is located on the periphery of the conical surface of FS of this system.

The essence of the system (the fixed set) is located on the axis of FS of this system. FS of the fixed set is wrapped by FS of the neutral set, and it is wrapped by FS of the variable set. The development of the system (from phylogenesis to ontogenesis) in this sequence is carried out.

The basis of FS of the set of the system is a surface, through which the system communicates with the external medium of the macrosystem, to which it belongs. This

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contact is a means for the development of the macrosystem into hierarchical aspect. The development formes new systems and links between them.

The trajectories of different menaging factors in different directions cross FS of the macrosystem. They form differences between the systems of the macrosystem. Each system is managed by different combination of factors.

The conical surface of FS of a system carries out a contact with other systems by the macrosystem. The contacts are means of mutuall stabilization of the systems and stabilization of the macrosystem to which they belong.

The scheme of Fig.1 illustrates the development of FS of the set of macrosystem as fractal by the sets of its systems. The scheme of Fig.2 illustrates the fractal development of fractal FS of the system.

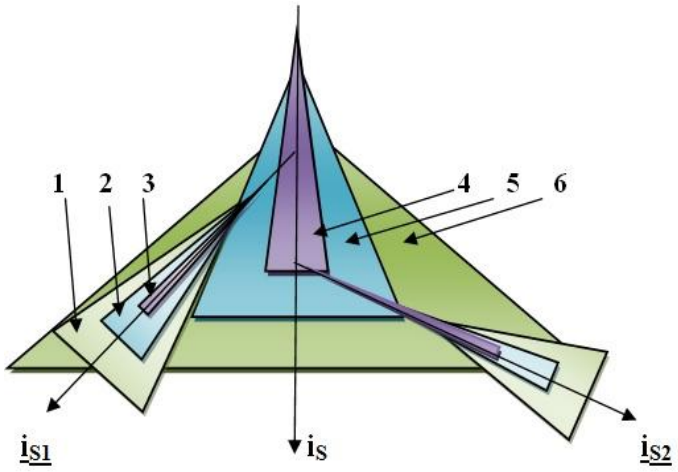

Fig. 2. Scheme of a cross-section of functional space (FS) of set of a system, which includes the functional spaces of two subsystems

1 - FS of the variable set of subsystem
2 - FS of the neutral set of subsystem
3 - FS of the fixed set of subsystem
4 - FS of the fixed set of the system
5 - FS of the neutral set of the system
6 - FS of the variable set of the system
i_S – direction of the hierarchical development of a system
$\underline{i}_{S\_1}$ - direction of hierarchical development of a subsystem 1
$\underline{i}_{S\_2}$ - direction of hierarchical development of a subsystem 2

The subsystems involve in the interaction of a system with its external medium. As greater is their participation in this process, as close to the their surface is located FS of the system.

Respectively the direction of development $\underline{\mathbf{i}}_{S1}$ of a subsystem 1 in the process of its individual development may approach or move away from the direction of development $\mathbf{i}_S$ of the system. This hesitation formes corrugated surface of FS of the subsystem.

The fractal development of FS of a system or a subsystem forms a nonlinear configuration of their surface.

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Development and structure

If the system has occurred first and after that - its subsystems, then FS of the system covers *FS-s* of the subsystems (fig.3a). In this case the elements that make up the system, include a memory for the backstory of this system in their structure (for example: construction of the organism from the fertilized egg); the differentiation of the knowledge of the scientific trends).

A system may forme a subsystem *FS-s*, which goes beyond its borders (fig.3a) - called pathology in biology.

If the subsystems arise before the system, then FS of the system covers part of the FS-s of the subsystems (fig.3b). In this case, the system includes only part of the backstory of the elements that build it. For example: formation of electronic items and then - their connecting in scheme; the including of artificial organs to the organism; formation of compounded pictures on the base of known imagination.

In particular, the *FS-s* of the subsystem may not differ substantially from the FS of the system of origin (fig.3b). For example, cloning of organ.

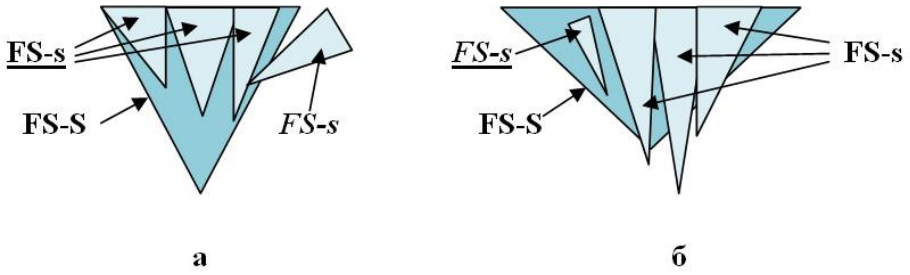

Fig. 3. Configuration of cone functional spaces FS-S of the system S
a) the subsystems s are formed after the system S (deduction)
b) the subsystems s are formed before the system S (induction)
***FS-s* - FS of a subsystem that develops in FS of the system from which it starts.**
***FS-s* - FS of a subsystem that develops outside of FS of the system from which it starts**

There is free topological space in FS of the system. It is necessary for free orientation of FS of the subsystems in the FS of the system.

Conclusions

1. **There is a potential for the formation of multiple versions of a system without considerable modifications of its characteristics.**
2. **In the general case, the unrealised potential for development of a system, according to conclusion 1 are a result of its evolutionary development.**
3. **The potential for development of a system characterises a part of the resource, which provides a resistance of the macrosystem.**
4. **The development of the set of a system can be realized through the individual development of its subsystems (external set of the system) or by bringing together of elements in a common structure (internal set of the system).**
5. **The fixed set is the basic resource for the development of a system. The minimal change of the fixed set causes a substantial change in the behavior of a system.**

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Basic terminology

1. **Level of organization** (i) – a system of interconnections with a certain degree of complexity
2. **Subsystem** – a relatively autonomous component of the system
3. **System** – a relatively autonomous constituent of the macrosystem
4. **Macrosystem** – a sustainable structure from multiple systems
5. **Complexity** – average number of interconnections between one element and multiple items from the same system
6. **Structure** – the elements and links between them
7. **Set** – a system of the most common characteristics of an object
8. **Functional space** – an abstract topological space of power and information, which characterizes the set of a particular system