TOPOLOGY OF PROCESSES OF RANK

Abstract: The set of a system realizes simultaneously a process of searching for a solution (rank r1), a process of interaction with the object (rank r2), a process of individual development (rank r3), a process of development of the system type (rank r4), a process of development of the makro type of the system (rank r5) and so on. The processes of low rank (r1, r2) modulate the processes of a higher rank (r3, r4).

The purpose of the article is to present a theoretical model of representation of the processes of different rank in a topological aspect.

It is established on the basis of the theoretical model, that the search for a solution depending on the rank processes can be modeled topologicaly in functional plane by a fractal with a nonlinear trajectory.

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Keywords:
Psychology, set, development, theoretical model, topology, rank.

Topological model

We mark the topological area of a normal functioning of a system as "a functional space". The functional space of a system is a cone. The tip of the cone includes processes in the fixed set of a system. The base of the cone includes the processes of the variable set of a system.

We mark the cross-section of the functional space of a system as "a functional plane" (FP). FP is an object under review. It is in the base of the conical functional space of the system and belongs to processes of rank r1.

The borderlines of FP of a system can be idealised as a circle. In the center of this circle is an area that includes the specifications and processes of the fixed set of the system. The specifications and the processes of the variable set of the system are located on the sidelines of the same circle. They change most quickly.

Every trajectory of a process is seen as a trajectory of development of main ruling factor of this process. Every ruling factor has a trajectory in FP. The change of the rank of a process changes the main ruling factor. Accordingly, the transitions of processes of rank manifest themselves as spurs of the trajectories of the ruling processes (fig.1).

An evolutionary continuity exists between the processes of rank. Every process of a high rank has a projection on a process of a lower rank. In particular, the process of rank r1 includes projections of processes of ranks r2, r3, r4, r5, etc.
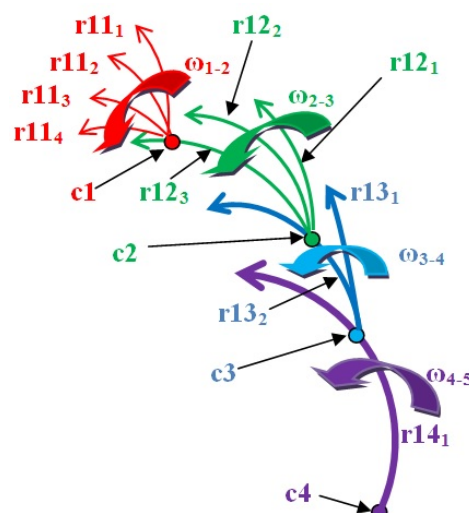
Fig.1. Schematic diagram of location of projections of rank in the functional plane of processes of rank r1

$r11_1$, $r11_2$, $r11_3$, $r11_4$ - consecutive stages $(_{1,\,2,\,3,\,4})$ of search for methods for search for a solution (methodological process of rank r1) of problem of interaction between subject and object; this problem is formed in the third stage of the interaction between subject and object; it has a projection $r12_3$ in the process of search for a solution r1

$r12_1$, $r12_2$, $r12_3$ - projections of successive stages $(_{1,\,2,\,3})$ of interaction between subject and object on the process of search for a solution r1

$r13_1$, $r13_2$ - projections of successive stages $(_{1,2})$ of individual development of a subject on the process of search for a solution r1

$r14_1$ – projection of stage $(_1)$ of development of the type of subject on the process of search for a solution r1

c1, c2, c3, c4 – current center of rotation of projection of processes of ranks, respectively r1, r2, r3, r4 in the functional plane of the processes of rank r1

$\omega_{1\text{-}2}$ – angular velocity ω of the projections of the processes of rank r1 with regard to processes of rank r2 in the functional plane of the processes of rank r1

$\omega_{2\text{-}3}$ - angular velocity ω of the projections of the processes of rank r2 with regard to the processes of rank r3 in the functional plane of the processes of rank r1

$\omega_{3\text{-}4}$ - angular velocity ω of the projections of the processes of rank r3 with regard to the processes of rank r4 in the functional plane of the processes of rank r1

$\omega_{4\text{-}5}$ - angular velocity ω of the projections of the processes of rank r4 with regard to the processes of rank r5 in the functional plane of the processes of rank r1

trajectory of process of rank; this process of rank is topical in the process of search for a solution

The processes of rank r1 change most quickly. The processes of rank r2 are slower. The processes of rank r3 are more slow and so on. Accordingly, the ratio between angular velocities of processes of rank is:

(1) $\omega_{1\text{-}2} > \omega_{2\text{-}3} > \omega_{3\text{-}4} > \omega_{4\text{-}5}$,

where $\omega_{1\text{-}2}$ - angular velocity ω of the projections of the processes of rank r1 in FP
                with regard of process of rank r2,

        $\omega_{2\text{-}3}$ - angular velocity ω of the projections of the processes of rank r2 in FP
                with regard of process of rank r3,

$\omega_{3\text{-}4}$ - angular velocity ω of the projections of the processes of rank r3 in FP
        with regard of process of rank r4,

$\omega_{4\text{-}5}$ - angular velocity ω of the projections of the processes of rank r4 in FP
        with regard of process of rank r5,

FP – functional plane of the processes of rank r on which the processes
        of higher rank are projected.

The processes of the adjacent ranks in FP can run at the same or different direction of angular displacement:

(2) $\pm \omega_1 = \pm \omega_{1\text{-}2} \pm \omega_{2\text{-}3} \pm \omega_{3\text{-}4} + \omega_{4\text{-}5}$,

where ω_1 - angular velocity ω of projections of the processes of rank r1 in FP with regard of
        the processes of rank r2, r3, r4, r5

$\pm$ - positive (+) or negative (-) direction of angular velocity ω of a process of rank in
the FP with regard of the orientation of the angular velocity of a process of rank r5.

It follows from (1) that the processes with minimum rank are decisive for the development of a specific process.

The system of a subject is formed in stage c3 of the individual development of a kind (species) (fig.1). The individual development of the subject is illustrated by two stages: $r13_1$, $r13_2$ (example: children and mature stage of development).

The subject interacts with an object in stage c2 of the individual development of the subject. The interaction of the subject with an object is illustrated through three stages $r12_1$, $r12_2$, $r12_3$ (example: preconditions, development, final).

The subject is looking for a solution to your interaction with the object in stage c1.

The search for a method for a solution of the problem is illustrated by four stages: $r11_1$, $r11_2$, $r11_3$, $r11_4$.

Every possibility of search for a solution includes the restrictive conditions of higher rank. All processes of rank are projected on the information, that is connected with searh for a solution of a specific problem.

It follows from fig.1, that the field of search for a solution is a small part (sector) from FP.

When two systems of general kind interact, the diversity of their processes of rank may be determined of rank, which is less than r4. This interaction depends on the processes that are different from the processes in the type to which they belong.

For example: conflict between subject and object. The interruption of a relation with an object runs fast in yong age, it is a longer process in the middle ages, it is a painful process in old age.

Accordingly, the interruption of a relation with an object forms a new degree of freedom for individual development in the initial phase of development of the subject. The interruption of a relation with an object in the middle phase of development in one aspect opens up new possibilities for individual development of the subject, and in another aspect it is a deterrent for the development of the subject. The interruption of a relation with an object could be fatal for the subject in old age.

Fractal patterns of search for a solution

From the point of view of the process of search for a solution of a specific problem it can be assumed that:

➢ the development of the type of the subject has stopped,
➢ the individual development of the subject is practically fixed,
➢ the interaction of the subject with the object flows very slowly.

Accordingly, the curve of trajectory of rank r1 rotates intensively compared to other curves (1).

There are points in the trajectory $r11_1$, $r11_2$, $r11_3$, $r11_4$ ... (fig.1), in which there is a possibility to form a solution. In every one of these points can be formed alternative solutions. One of them (A) is in the direction of the trend of search for a solution and the other (B) is in the opposite direction (fig.2).
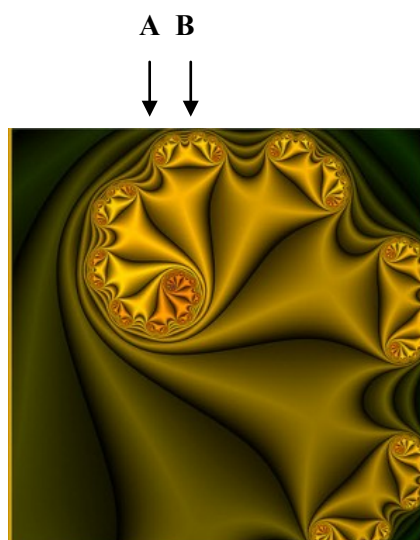
A B

Fig. 2. Fractal illustration of stages of search for a solution in functional plane with local polar deviations in the trajectory of the trend of this process [http://findicators.com/indicator-fractals/]

For example:

➢ The development of the cars in order to reduce their consumption can be achieved in direction of improvement of their engines (a perspective trend) and in direction to streamline of their surface (a return to some known possibilities).

➢ The life obtaines value when a valuable purpose is haunted. If there is no such purpose, then the life takes a meaning as care for other favorite creature.

The field of decision may deviate o ut of the trend of searching for a solution (fig.3).
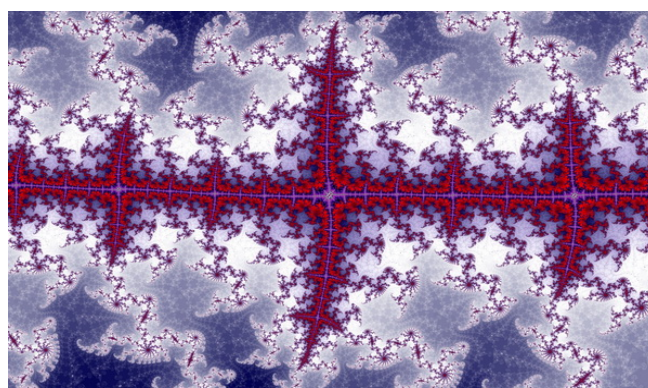

Fig. 3. Fractal illustration of stages of search for a solution in the functional plane with local polar deviations outside the trend of this process [http://www.artwall.ru/catalog/fraktali]

For example:

➢ The development of cars in order to reduce their consumption can be achieved in a direction of improvement of the electric motor and in a direction of improvement of batteries for these motors.

➢ The insecure person holds the negotiations through his representative or he is looking to clarify the details.

Orientation of trajectories of ruling factors

Every concept is a model of characteristic of an object or a process. In the process of development of the knowledge it increases, then the importance of any particular characteristic decreases. The knowledge is a process of continuity between the concepts from the past to the present. Accordingly, the trajectory of a ruling factor moves initially accelerating to the centre of FP, then it moves accelerating to its periphery. The transition from one to another trend is realized in the field of a certain rank (fig.4).

The category is a means of ruling of processes of high rank. These processes characterize the fixed set of a system. Accordingly, the trajectory of a category crosses an area of high rank (for example r4).

The term is a tool to rul processes of low rank. These processes characterize the variable set of a system. Accordingly, the trajectory of a term crosses the area from low rank (for example r1).

Every trajectory of a ruling factor U can be seen as a multi core cable. It includes multiple trajectories of development of concepts.

We have a postulate, that the relocation of the trajectory of a particular process in a direction counterclockwise in FP conforms to the natural development of this process.

We have a postulate, that the relocation of the trajectory of a particular process clockwise in FP corresponds to a regress, a decay, a degradation.

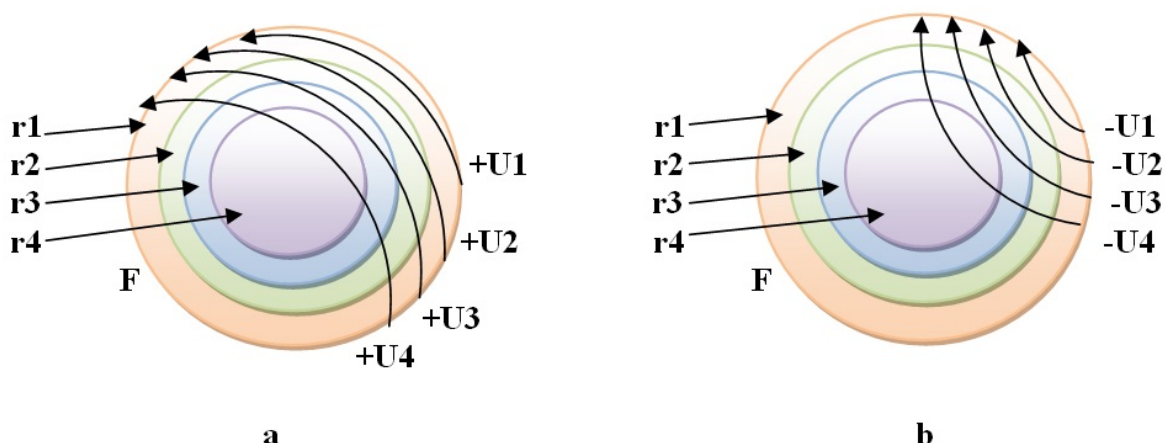Every ruling factor has two trajectories of change: positive and negative.

a   b

Fig.4. Available on the trajectories of ruling factors in functional plane F of rank r1
r1, r2, r3, r4 – areas of rank, respectively r1, r2, r3 , r4
+ U1, + U2, + U3, + U4 – a trajectory of positively orientated ruling factors that rul processes as a priority of rank, respectively r1, r2, r3 , r4
- U1, - U2, - U3, - U4 – trajectory of negative-oriented ruling factors that rul processes as a priority of rank, respectively r1, r2, r3 , r4

Conclusions

1. **The search for a solution depending on rank processes can be modeled topologicaly in a functional plane by a fractal.**
2. **The non-linear topological representation of processes of rank is a graphical model of a change of the characteristics of these processes.**
3. **Every system interacts with external objects by a small part of their potential. It may be provided topologicaly by part of the area of the functional plane of rank r1, in which processes of searching for a solution flow.**
4. **It follows from conclusion 2, that the functional space of a system is orientated towards the functional space of every object with which it interacts.**